

Supplementary Table 1. Spatial correlations between the positron emission tomography-derived maps of dopamine transporter (DAT) and multiparametric mapping-derived Parkinson's disease-related group differences in effective transverse relaxation rate within subcortical regions.

	rho	CI_{lower}	CI_{Upper}	Cohen's f^2	p_{uncorr}	p_{FDR}
TH.AN	-0.443	-0.493	-0.391	0.245	0.0002	0.0003
SNr	-0.247	-0.304	-0.189	0.065	0.0002	0.0003
HN	-0.193	-0.138	-0.099	0.039	0.0016	0.0020
CN	-0.191	0.158	0.191	0.038	0.0002	0.0003
SN	-0.169	-0.218	-0.119	0.029	0.0002	0.0003
DN	-0.165	0.082	0.160	0.028	0.0002	0.0003
GPe	-0.156	-0.359	-0.308	0.025	0.0002	0.0003
GP	-0.155	-0.181	-0.128	0.025	0.0002	0.0003
TH.IM	-0.131	-0.162	-0.101	0.018	0.0002	0.0003
TH.VN	-0.104	-0.125	-0.098	0.011	0.0002	0.0003
GPI	-0.094	-0.095	-0.037	0.009	0.0034	0.0041
SNC	-0.092	-0.187	-0.054	0.008	0.0078	0.0092
TH.P	-0.083	-0.110	-0.057	0.007	0.0002	0.0003
Thalamus	-0.058	-0.072	-0.044	0.003	0.0002	0.0003
TH.MN	-0.054	-0.081	-0.027	0.003	0.0004	0.0005
RN	0.009	-0.060	0.058	<0.001	0.7778	0.7905
STN	0.234	0.154	0.311	0.058	0.0002	0.0003
Pu	0.243	-0.283	-0.253	0.063	0.0002	0.0003
VeP	0.506	0.441	0.569	0.344	0.0002	0.0003
NAC	0.661	0.422	0.508	0.777	0.0002	0.0003

We assessed the spatial correlation between multiparametric mapping-derived group differences using t-maps containing PwPD > HCs effective transverse relaxation rate and a positron emission tomography-derived DAT map. For each correlation test, we report Spearman's correlation coefficient (ρ), effect size (Cohen's f^2), nominal and false discovery rate (FDR)-adjusted p-values (p_{uncorr} and p_{FDR}). CN: caudate nucleus. DN: dentate nucleus of the cerebellum. GP (GPe/GPI): globus pallidus (external/internal). HCs: healthy controls. HN: habenular nucleus. NAC: nucleus accumbens. Pu: putamen. PwPD: patients with Parkinson's disease. RN: red nucleus. SN (SNc/SNr): substantia nigra (pars compacta/pars reticulata). STN: subthalamic nucleus. TH.AN: anterior thalamic nucleus. TH.IM: intralaminar thalamic nucleus. TH.MN: medial thalamic nucleus. TH.P: posterior thalamic nucleus. TH.VN: ventral thalamic nucleus. VeP: ventral pallidum.

Supplementary Table 2. Spatial correlations between the positron emission tomography-derived map of dopamine transporter (DAT) and multiparametric mapping-derived Parkinson's disease-related group differences in longitudinal relaxation rate within subcortical regions.

	rho	CI_{lower}	CI_{Upper}	Cohen's f^2	p_{uncorr}	p_{FDR}
GPe	-0.334	-0.359	-0.308	0.125	0.0002	0.0003
GP	-0.294	-0.319	-0.269	0.095	0.0002	0.0003
SNr	-0.282	-0.337	-0.224	0.086	0.0002	0.0003
Pu	-0.268	-0.283	-0.253	0.089	0.0002	0.0003
SN	-0.196	-0.244	-0.147	0.040	0.0002	0.0003
SNC	-0.121	-0.187	-0.054	0.015	0.0002	0.0003
GPI	-0.033	-0.095	0.029	0.001	0.3037	0.3207
HN	-0.023	-0.138	0.093	0.001	0.6999	0.7164
TH.MN	-0.020	-0.048	0.007	<0.001	0.1576	0.1714
TH.AN	-0.013	-0.076	0.050	<0.001	0.7017	0.7166
RN	-0.001	-0.060	0.058	<0.001	0.6697	0.6871
TH.IM	0.096	0.065	0.126	0.009	0.0002	0.0003
Thalamus	0.100	0.086	0.114	0.010	0.0002	0.0003
DN	0.121	0.082	0.160	0.015	0.0002	0.0003
CN	0.175	0.158	0.191	0.031	0.0002	0.0003
TH.P	0.197	0.171	0.223	0.041	0.0002	0.0003
TH.VN	0.292	0.272	0.311	0.093	0.0002	0.0003
STN	0.347	0.271	0.418	0.137	0.0002	0.0003
NAC	0.466	0.422	0.508	0.277	0.0002	0.0003
VeP	0.617	0.562	0.666	0.614	0.0002	0.0003

We assessed the spatial correlation between multiparametric mapping-derived group differences using t-maps containing PwPD > HCs longitudinal relaxation rate and a positron emission tomography-derived DAT map. For each correlation test, we report Spearman's correlation coefficient (ρ), effect size (Cohen's f^2), nominal and false discovery rate (FDR)-adjusted p-values (p_{uncorr} and p_{FDR}). CN: caudate nucleus. DN: dentate nucleus of the cerebellum. GP (GPe/GPI): globus pallidus (external/internal). HCs: healthy controls. HN: habenular nucleus. NAC: nucleus accumbens. Pu: putamen. PwPD: patients with Parkinson's disease. RN: red nucleus. SN (SNc/SNr): substantia nigra (pars compacta/pars reticulata). STN: subthalamic nucleus. TH.AN: anterior thalamic nucleus. TH.IM: intralaminar thalamic nucleus. TH.MN: medial thalamic nucleus. TH.P: posterior thalamic nucleus. TH.VN: ventral thalamic nucleus. VeP: ventral pallidum.

Supplementary Table 3. Spatial correlations between the positron emission tomography-derived map of dopamine transporter (DAT) and multiparametric mapping-derived Parkinson's disease-related group differences in proton density within subcortical regions.

	rho	CI_{lower}	CI_{Upper}	Cohen's f^2	p_{uncorr}	p_{FDR}
TH.IM	-0.492	-0.515	-0.467	0.319	0.0002	0.0003
VeP	-0.469	-0.532	-0.401	0.282	0.0002	0.0003
SNr	-0.347	-0.400	-0.291	0.137	0.0002	0.0003
NAC	-0.325	-0.373	-0.275	0.118	0.0002	0.0003
SN	-0.251	-0.298	-0.203	0.068	0.0002	0.0003
TH.VN	-0.225	-0.245	-0.204	0.053	0.0002	0.0003
GPe	-0.213	-0.240	-0.185	0.047	0.0002	0.0003
GP	-0.207	-0.232	-0.181	0.045	0.0002	0.0003
Thalamus	-0.190	-0.203	-0.176	0.037	0.0002	0.0003
Pu	-0.188	-0.203	-0.172	0.037	0.0002	0.0003
TH.AN	-0.172	-0.233	-0.081	0.031	0.0002	0.0003
TH.MN	-0.108	-0.135	-0.081	0.012	0.0002	0.0003
CN	-0.070	-0.087	-0.053	0.005	0.0002	0.0003
GPI	-0.058	-0.120	0.004	0.003	0.0688	0.0769
RN	0.021	-0.038	0.080	<0.001	0.4847	0.5033
TH.P	0.105	0.079	0.132	0.011	0.0002	0.0003
DN	0.145	0.106	0.183	0.022	0.0002	0.0003
HN	0.147	0.032	0.258	0.022	0.0118	0.0137
SNc	0.156	0.090	0.221	0.025	0.0002	0.0003
STN	0.280	0.201	0.354	0.085	0.0002	0.0003

We assessed the spatial correlation between multiparametric mapping-derived group differences using t-maps containing PwPD > HCs proton density and a positron emission tomography-derived DAT map. For each correlation test, we report Spearman's correlation coefficient (ρ), effect size (Cohen's f^2), nominal and false discovery rate (FDR)-adjusted p-values (p_{uncorr} and p_{FDR}). CN: caudate nucleus. DN: dentate nucleus of the cerebellum. GP (GPe/GPI): globus pallidus (external/internal). HCs: healthy controls. HN: habenular nucleus. NAC: nucleus accumbens. Pu: putamen. PwPD: patients with Parkinson's disease. RN: red nucleus. SN (SNc/SNr): substantia nigra (pars compacta/pars reticulata). STN: subthalamic nucleus. TH.AN: anterior thalamic nucleus. TH.IM: intralaminar thalamic nucleus. TH.MN: medial thalamic nucleus. TH.P: posterior thalamic nucleus. TH.VN: ventral thalamic nucleus. VeP: ventral pallidum.

Supplementary Table 4. Spatial correlations between the positron emission tomography-derived map of dopamine transporter (DAT) and multiparametric mapping-derived Parkinson's disease-related group differences in magnetic transfer saturation within subcortical regions.

	rho	CI_{lower}	CI_{Upper}	Cohen's f^2	p_{uncorr}	p_{FDR}
SNr	-0.248	-0.305	-0.189	0.066	0.0002	0.0003
SN	-0.163	-0.212	-0.114	0.027	0.0002	0.0003
SNc	-0.084	-0.150	-0.017	0.007	0.0002	0.0003
RN	0.005	-0.054	0.547	<0.001	0.8536	0.8636
CN	0.037	0.020	0.054	0.001	0.0002	0.0003
GP	0.117	0.090	0.142	0.014	0.0002	0.0003
GPe	0.140	0.111	0.168	0.020	0.0002	0.0003
HN	0.144	0.029	0.255	0.021	0.0002	0.0003
TH.AN	0.187	0.125	0.247	0.036	0.0002	0.0003
GPi	0.213	0.153	0.272	0.048	0.0002	0.0003
DN	0.215	0.177	0.252	0.049	0.0002	0.0003
TH.MN	0.243	0.217	0.268	0.063	0.0002	0.0003
Pu	0.245	0.229	0.260	0.064	0.0002	0.0003
Thalamus	0.359	0.347	0.371	0.148	0.0002	0.0003
STN	0.383	0.310	0.452	0.172	0.0002	0.0003
TH.IM	0.414	0.387	0.439	0.206	0.0002	0.0003
NAC	0.453	0.408	0.495	0.258	0.0002	0.0003
TH.P	0.460	0.438	0.481	0.268	0.0002	0.0003
TH.VN	0.544	0.528	0.559	0.419	0.0002	0.0003
VeP	0.782	0.747	0.812	1.570	0.0002	0.0003

We assessed the spatial correlation between multiparametric mapping-derived group differences using t-maps containing PwPD > HCs magnetic transfer saturation and a positron emission tomography-derived DAT map. For each correlation test, we report Spearman's correlation coefficient (ρ), effect size (Cohen's f^2), nominal and false discovery rate (FDR)-adjusted p-values (p_{uncorr} and p_{FDR}). CN: caudate nucleus. DN: dentate nucleus of the cerebellum. GP (GPe/GPi): globus pallidus (external/internal). HCs: healthy controls. HN: habenular nucleus. NAC: nucleus accumbens. Pu: putamen. PwPD: patients with Parkinson's disease. RN: red nucleus. SN (SNc/SNr): substantia nigra (pars compacta/pars reticulata). STN: subthalamic nucleus. TH.AN: anterior thalamic nucleus. TH.IM: intralaminar thalamic nucleus. TH.MN: medial thalamic nucleus. TH.P: posterior thalamic nucleus. TH.VN: ventral thalamic nucleus. VeP: ventral pallidum.

Supplementary Table 5. Spatial correlations between the positron emission tomography-derived map of 6-¹⁸F]fluoro-L-DOPA (FDOPA) and multiparametric mapping-derived Parkinson's disease-related group differences in effective transverse relaxation rate within subcortical regions.

	rho	CI_{lower}	CI_{Upper}	Cohen's f²	p_{uncorr}	p_{FDR}
TH.AN	-0.168	-0.228	-0.106	0.029	0.0002	0.0003
GPI	-0.140	-0.106	-0.087	0.020	0.0002	0.0003
HN	-0.131	-0.270	-0.045	0.017	0.0230	0.0258
CN	-0.117	0.042	0.076	0.014	0.0002	0.0003
RN	-0.100	0.220	0.329	0.010	0.0004	0.0005
GP	-0.087	-0.114	-0.061	0.008	0.0002	0.0003
GPe	-0.079	-0.467	-0.421	0.006	0.0002	0.0003
STN	-0.017	-0.100	0.066	<0.001	0.6955	0.7136
VeP	0.042	-0.043	0.125	0.002	0.3497	0.3675
Pu	0.065	-0.443	-0.417	0.004	0.0002	0.0003
TH.VN	0.065	0.044	0.086	0.004	0.0002	0.0003
DN	0.097	0.141	0.217	0.009	0.0002	0.0003
TH.IM	0.164	0.134	0.194	0.028	0.0002	0.0003
Thalamus	0.181	0.167	0.194	0.034	0.0002	0.0003
TH.MN	0.310	0.285	0.334	0.106	0.0002	0.0003
TH.P	0.328	0.303	0.351	0.120	0.0002	0.0003
NAC	0.419	0.069	0.177	0.213	0.0002	0.0003
SNc	0.458	0.363	0.474	0.266	0.0002	0.0003
SN	0.510	0.417	0.546	0.351	0.0002	0.0003
SNr	0.515	0.469	0.559	0.362	0.0002	0.0003

We assessed the spatial correlation between multiparametric mapping-derived group differences using t-maps containing PwPD > HCs effective transverse relaxation rate and a positron emission tomography-derived FDOPA map. For each correlation test, we report Spearman's correlation coefficient (rho), effect size (Cohen's f²), nominal and false discovery rate (FDR)-adjusted p-values (p_{uncorr} and p_{FDR}). CN: caudate nucleus. DN: dentate nucleus of the cerebellum. GP (GPe/GPI): globus pallidus (external/internal). HCs: healthy controls. HN: habenular nucleus. NAC: nucleus accumbens. Pu: putamen. PwPD: patients with Parkinson's disease. RN: red nucleus. SN (SNc/SNr): substantia nigra (pars compacta/pars reticulata). STN: subthalamic nucleus. TH.AN: anterior thalamic nucleus. TH.IM: intralaminar thalamic nucleus. TH.MN: medial thalamic nucleus. TH.P: posterior thalamic nucleus. TH.VN: ventral thalamic nucleus. VeP: ventral pallidum.

Supplementary Table 6. Spatial correlations between the positron emission tomography-derived map of 6-[¹⁸F]fluoro-L-DOPA (FDOPA) and multiparametric mapping-derived Parkinson's disease-related group differences in longitudinal relaxation rate within subcortical regions.

	rho	CI_{lower}	CI_{Upper}	Cohen's f²	p_{uncorr}	p_{FDR}
TH.AN	-0.564	-0.605	-0.519	0.465	0.0002	0.0003
GPe	-0.444	-0.467	-0.421	0.246	0.0002	0.0003
Pu	-0.430	-0.443	-0.417	0.227	0.0002	0.0003
GP	-0.360	-0.383	-0.337	0.149	0.0230	0.0258
HN	-0.159	-0.270	-0.047	0.026	0.0054	0.0062
TH.VN	-0.133	-0.154	-0.112	0.018	0.0002	0.0003
STN	-0.063	-0.145	0.020	0.004	0.1416	0.1536
GPi	-0.044	-0.106	0.018	0.002	0.1730	0.1863
Thalamus	-0.026	-0.040	-0.012	0.001	0.0006	0.0007
TH.IM	0.009	-0.022	0.040	<0.001	0.5765	0.5972
TH.P	0.038	0.011	0.065	0.001	0.0048	0.0055
TH.MN	0.046	0.018	0.073	0.002	0.0014	0.0016
CN	0.097	0.042	0.077	0.009	0.0002	0.0003
NAC	0.124	0.069	0.177	0.016	0.0002	0.0003
DN	0.179	0.141	0.217	0.033	0.0002	0.0003
RN	0.276	0.220	0.329	0.082	0.0002	0.0003
VeP	0.281	0.202	0.357	0.086	0.0002	0.0003
SNc	0.420	0.363	0.474	0.214	0.0002	0.0003
SNr	0.449	0.399	0.497	0.253	0.0002	0.0003
SN	0.459	0.418	0.498	0.268	0.0002	0.0003

We assessed the spatial correlation between multiparametric mapping-derived group differences using t-maps containing PwPD > HCs longitudinal relaxation rate and a positron emission tomography-derived FDOPA map. For each correlation test, we report Spearman's correlation coefficient (rho), effect size (Cohen's f²), nominal and false discovery rate (FDR)-adjusted p-values (p_{uncorr} and p_{FDR}). CN: caudate nucleus. DN: dentate nucleus of the cerebellum. GP (GPe/GPi): globus pallidus (external/internal). HCs: healthy controls. HN: habenular nucleus. NAC: nucleus accumbens. Pu: putamen. PwPD: patients with Parkinson's disease. RN: red nucleus. SN (SNc/SNr): substantia nigra (pars compacta/pars reticulata). STN: subthalamic nucleus. TH.AN: anterior thalamic nucleus. TH.IM: intralaminar thalamic nucleus. TH.MN: medial thalamic nucleus. TH.P: posterior thalamic nucleus. TH.VN: ventral thalamic nucleus. VeP: ventral pallidum.

Supplementary Table 7. Spatial correlations between the positron emission tomography-derived map of 6-[¹⁸F]fluoro-L-DOPA (FDOPA) and multiparametric mapping-derived Parkinson's disease-related group differences in proton density within subcortical regions.

	rho	CI_{lower}	CI_{Upper}	Cohen's f²	p_{uncorr}	p_{FDR}
SNC	-0.454	-0.505	-0.398	0.259	0.0002	0.0003
GP	-0.225	-0.250	-0.200	0.053	0.0002	0.0003
GPe	-0.193	-0.220	-0.165	0.039	0.0002	0.0003
CN	-0.156	-0.172	-0.139	0.025	0.0002	0.0003
TH.AN	-0.144	-0.205	-0.081	0.021	0.0002	0.0003
TH.P	-0.070	-0.097	-0.043	0.005	0.0002	0.0003
STN	-0.052	-0.134	0.032	0.003	0.2288	0.2428
VeP	-0.037	-0.120	0.047	0.001	0.3907	0.4086
Pu	-0.020	-0.036	-0.004	<0.001	0.0166	0.0188
GPI	-0.006	-0.068	0.056	<0.001	0.8624	0.8702
NAC	0.013	-0.042	0.068	<0.001	0.6455	0.6655
Thalamus	0.039	0.025	0.053	0.002	0.0002	0.0003
DN	0.168	0.129	0.206	0.029	0.0002	0.0003
TH.IM	0.195	0.165	0.225	0.040	0.0002	0.0003
TH.MN	0.246	0.220	0.271	0.064	0.0002	0.0003
HN	0.259	0.148	0.364	0.072	0.0002	0.0003
TH.VN	0.266	0.246	0.286	0.076	0.0002	0.0003
RN	0.463	0.415	0.508	0.273	0.0002	0.0003
SNr	0.506	0.459	0.550	0.344	0.0002	0.0003
SN	0.527	0.489	0.563	0.385	0.0002	0.0003

We assessed the spatial correlation between multiparametric mapping-derived group differences using t-maps containing PwPD > HCs proton density and a positron emission tomography-derived FDOPA map. For each correlation test, we report Spearman's correlation coefficient (rho), effect size (Cohen's f²), nominal and false discovery rate (FDR)-adjusted p-values (p_{uncorr} and p_{FDR}). CN: caudate nucleus. DN: dentate nucleus of the cerebellum. GP (GPe/GPi): globus pallidus (external/internal). HCs: healthy controls. HN: habenular nucleus. NAC: nucleus accumbens. Pu: putamen. PwPD: patients with Parkinson's disease. RN: red nucleus. SN (SNc/SNr): substantia nigra (pars compacta/pars reticulata). STN: subthalamic nucleus. TH.AN: anterior thalamic nucleus. TH.IM: intralaminar thalamic nucleus. TH.MN: medial thalamic nucleus. TH.P: posterior thalamic nucleus. TH.VN: ventral thalamic nucleus. VeP: ventral pallidum.

Supplementary Table 8. Spatial correlations between the positron emission tomography-derived map of 6-¹⁸F]fluoro-L-DOPA (FDOPA) and multiparametric mapping-derived Parkinson's disease-related group differences in magnetic transfer saturation within subcortical regions.

	rho	CI_{lower}	CI_{Upper}	Cohen's f^2	p_{uncorr}	p_{FDR}
TH.AN	-0.416	-0.467	-0.393	0.210	0.0002	0.0003
STN	-0.137	-0.217	-0.054	0.019	0.0008	0.0009
GP	-0.064	-0.091	-0.037	0.004	0.0002	0.0003
GPe	-0.040	-0.069	-0.011	0.002	0.0058	0.0066
DN	0.085	-0.016	0.086	0.007	0.2288	0.2428
Pu	0.107	0.091	0.123	0.012	0.0002	0.0003
HN	0.126	0.011	0.238	0.016	0.0300	0.0335
TH.VN	0.140	0.119	0.161	0.020	0.0002	0.0003
Thalamus	0.176	0.162	0.189	0.032	0.0002	0.0003
TH.IM	0.189	0.158	0.218	0.037	0.0002	0.0003
CN	0.197	0.180	0.213	0.040	0.0002	0.0003
TH.MN	0.287	0.261	0.311	0.089	0.0002	0.0003
GPI	0.329	0.272	0.383	0.121	0.0002	0.0003
TH.P	0.368	0.344	0.390	0.156	0.0002	0.0003
SNr	0.398	0.345	0.448	0.188	0.0002	0.0003
SN	0.420	0.377	0.461	0.214	0.0002	0.0003
SNC	0.430	0.374	0.483	0.227	0.0002	0.0003
NAC	0.471	0.427	0.512	0.285	0.0002	0.0003
RN	0.504	0.458	0.547	0.340	0.0002	0.0003
VeP	0.546	0.484	0.602	0.424	0.0002	0.0003

We assessed the spatial correlation between multiparametric mapping-derived group differences using t-maps containing PwPD > HCs magnetic transfer saturation and a positron emission tomography-derived FDOPA map. For each correlation test, we report Spearman's correlation coefficient (ρ), effect size (Cohen's f^2), nominal and false discovery rate (FDR)-adjusted p-values (p_{uncorr} and p_{FDR}). CN: caudate nucleus. DN: dentate nucleus of the cerebellum. GP (GPe/GPI): globus pallidus (external/internal). HCs: healthy controls. HN: habenular nucleus. NAC: nucleus accumbens. Pu: putamen. PwPD: patients with Parkinson's disease. RN: red nucleus. SN (SNc/SNr): substantia nigra (pars compacta/pars reticulata). STN: subthalamic nucleus. TH.AN: anterior thalamic nucleus. TH.IM: intralaminar thalamic nucleus. TH.MN: medial thalamic nucleus. TH.P: posterior thalamic nucleus. TH.VN: ventral thalamic nucleus. VeP: ventral pallidum.

Supplementary Table 9. Spatial correlations between positron emission tomography-derived map of dopamine D1 receptor (D1) and multiparametric mapping-derived Parkinson's disease-related group differences in effective transverse relaxation rate within subcortical regions.

	rho	CI_{lower}	CI_{Upper}	Cohen's f^2	p_{uncorr}	p_{FDR}
Gpi	-0.246	-0.262	-0.143	0.064	0.0002	0.0003
HN	-0.046	-0.007	0.573	0.002	0.4389	0.4579
STN	-0.025	-0.108	0.058	0.001	0.5963	0.6162
GP	-0.025	-0.051	0.002	0.001	0.0738	0.8150
CN	-0.009	-0.003	0.108	<0.001	0.3119	0.3286
DN	-0.002	-0.017	0.037	<0.001	0.9134	0.9155
GPe	0.013	-0.103	0.108	<0.001	0.3799	0.3983
RN	0.051	-0.028	0.136	0.003	0.0970	0.1066
TH.MN	0.072	0.044	0.099	0.005	0.0002	0.0003
Pu	0.138	-0.348	-0.336	0.020	0.0002	0.0003
TH.AN	0.214	0.153	0.273	0.048	0.0002	0.0003
NAC	0.216	0.001	0.111	0.049	0.0002	0.0003
Thalamus	0.224	0.210	0.273	0.053	0.0002	0.0003
TH.VN	0.230	0.210	0.251	0.056	0.0002	0.0003
TH.IM	0.289	0.261	0.318	0.091	0.0002	0.0003
VeP	0.324	0.247	0.397	0.118	0.0002	0.0003
TH.P	0.380	0.357	0.403	0.169	0.0002	0.0003
SNr	0.503	-0.304	-0.189	0.339	0.0003	0.0004
SNc	0.510	-0.187	-0.054	0.352	0.0002	0.0003
SN	0.527	0.490	0.563	0.385	0.0002	0.0003

We assessed the spatial correlation between multiparametric mapping-derived group differences using t-maps containing PwPD > HCs effective transverse relaxation rate values and a positron emission tomography-derived D1 map. For each correlation test, we report Spearman's correlation coefficient (ρ), effect size (Cohen's f^2), nominal and false discovery rate (FDR)-adjusted p-values (p_{uncorr} and p_{FDR}). CN: caudate nucleus. DN: dentate nucleus of the cerebellum. GP (GPe/GPi): globus pallidus (external/internal). HCs: healthy controls. HN: habenular nucleus. NAC: nucleus accumbens. Pu: putamen. PwPD: patients with Parkinson's disease. RN: red nucleus. SN (SNc/SNr): substantia nigra (pars compacta/pars reticulata). STN: subthalamic nucleus. TH.AN: anterior thalamic nucleus. TH.IM: intralaminar thalamic nucleus. TH.MN: medial thalamic nucleus. TH.P: posterior thalamic nucleus. TH.VN: ventral thalamic nucleus. VeP: ventral pallidum.

Supplementary Table 10. Spatial correlations between positron emission tomography-derived map of dopamine D1 receptor (D1) and multiparametric mapping-derived Parkinson's disease-related group differences in longitudinal relaxation rate within subcortical regions.

	ρ	CI_{lower}	CI_{upper}	Cohen's f^2	p_{uncorr}	p_{FDR}
TH.AN	-0.461	-0.510	-0.410	0.271	0.0002	0.0003
Pu	-0.348	-0.362	-0.334	0.138	0.0002	0.0003
GPe	-0.348	-0.373	-0.322	0.138	0.0002	0.0003
GP	-0.305	-0.329	-0.280	0.102	0.0002	0.0003
GPI	-0.203	-0.262	-0.142	0.043	0.0002	0.0003
TH.IM	-0.183	-0.213	-0.153	0.035	0.0002	0.0003
STN	-0.106	-0.188	-0.023	0.011	0.0002	0.0003
TH.P	-0.097	-0.123	-0.070	0.009	0.0002	0.0003
Thalamus	0.012	-0.002	0.025	<0.001	0.1100	0.1206
TH.VN	0.029	0.007	0.050	0.001	0.0066	0.0075
NAC	0.056	0.001	0.111	0.003	0.0414	0.0462
TH.MN	0.109	0.082	0.136	0.012	0.0002	0.0003
CN	0.125	0.108	0.142	0.016	0.0002	0.0003
DN	0.173	0.135	0.211	0.031	0.0002	0.0003
RN	0.410	0.360	0.458	0.202	0.0002	0.0003
SNr	0.411	0.359	0.461	0.203	0.0002	0.0003
VeP	0.432	0.361	0.498	0.229	0.0002	0.0003
SN	0.471	0.430	0.509	0.285	0.0002	0.0003
SNC	0.488	0.435	0.538	0.313	0.0002	0.0003
HN	0.512	0.397	0.573	0.355	0.0002	0.0003

We assessed the spatial correlation between multiparametric mapping-derived group differences using t-maps containing PwPD > HCs longitudinal relaxation rate values and a positron emission tomography-derived D1 map. For each correlation test, we report Spearman's correlation coefficient (ρ), effect size (Cohen's f^2), nominal and false discovery rate (FDR)-adjusted p-values (p_{uncorr} and p_{FDR}). CN: caudate nucleus. DN: dentate nucleus of the cerebellum. GP (GPe/GPI): globus pallidus (external/internal). HCs: healthy controls. HN: habenular nucleus. NAC: nucleus accumbens. Pu: putamen. PwPD: patients with Parkinson's disease. RN: red nucleus. SN (SNc/SNr): substantia nigra (pars compacta/pars reticulata). STN: subthalamic nucleus. TH.AN: anterior thalamic nucleus. TH.IM: intralaminar thalamic nucleus. TH.MN: medial thalamic nucleus. TH.P: posterior thalamic nucleus. TH.VN: ventral thalamic nucleus. VeP: ventral pallidum.

Supplementary Table 11. Spatial correlations between positron emission tomography-derived map of dopamine D1 receptor (D1) and multiparametric mapping-derived Parkinson's disease-related group differences in proton density within subcortical regions.

	rho	CI_{lower}	CI_{Upper}	Cohen's f^2	p_{uncorr}	p_{FDR}
SNC	-0.505	-0.553	-0.453	0.343	0.0002	0.0003
GP	-0.227	-0.252	-0.202	0.054	0.0002	0.0003
VeP	-0.215	-0.294	-0.133	0.048	0.0002	0.0003
GPI	-0.199	-0.258	-0.138	0.041	0.0002	0.0003
TH.P	-0.173	-0.199	-0.147	0.031	0.0002	0.0003
GPe	-0.156	-0.184	-0.127	0.025	0.0002	0.0003
CN	-0.144	-0.161	-0.128	0.021	0.0002	0.0003
TH.VN	-0.127	-0.148	-0.105	0.016	0.0002	0.0003
STN	-0.106	-0.177	-0.012	0.011	0.0002	0.0002
NAC	-0.059	-0.114	-0.004	0.003	0.0290	0.0352
Thalamus	-0.036	-0.050	-0.022	0.001	0.0002	0.0003
Pu	0.088	0.072	0.104	0.008	0.0002	0.0003
HN	0.103	-0.013	0.216	0.011	0.0826	0.0910
DN	0.205	0.167	0.242	0.044	0.0002	0.0003
TH.AN	0.211	0.150	0.271	0.047	0.0002	0.0003
TH.MN	0.386	0.362	0.409	0.175	0.0002	0.0003
SNr	0.473	0.424	0.520	0.289	0.0002	0.0003
SN	0.533	0.496	0.568	0.397	0.0002	0.0003
TH.IM	0.541	0.519	0.563	0.414	0.0002	0.0003
RN	0.543	0.500	0.583	0.418	0.0002	0.0003

We assessed the spatial correlation between multiparametric mapping-derived group differences using t-maps containing PwPD > HCs proton density values and a positron emission tomography-derived D1 map. For each correlation test, we report Spearman's correlation coefficient (rho), effect size (Cohen's f^2), nominal and false discovery rate (FDR)-adjusted p-values (p_{uncorr} and p_{FDR}). CN: caudate nucleus. DN: dentate nucleus of the cerebellum. GP (GPe/GPI): globus pallidus (external/internal). HCs: healthy controls. HN: habenular nucleus. NAC: nucleus accumbens. Pu: putamen. PwPD: patients with Parkinson's disease. RN: red nucleus. SN (SNc/SNr): substantia nigra (pars compacta/pars reticulata). STN: subthalamic nucleus. TH.AN: anterior thalamic nucleus. TH.IM: intralaminar thalamic nucleus. TH.MN: medial thalamic nucleus. TH.P: posterior thalamic nucleus. TH.VN: ventral thalamic nucleus. VeP: ventral pallidum.

Supplementary Table 12. Spatial correlations between positron emission tomography-derived map of dopamine D1 receptor (D1) and multiparametric mapping-derived Parkinson's disease-related group differences in magnetic transfer saturation within subcortical regions.

	rho	CI_{lower}	CI_{Upper}	Cohen's f^2	p_{uncorr}	p_{FDR}
TH.AN	-0.467	-0.515	-0.416	0.279	0.0002	0.0003
TH.VN	-0.239	-0.260	-0.219	0.061	0.0002	0.0003
TH.IM	-0.197	-0.226	-0.166	0.040	0.0002	0.0003
Thalamus	-0.160	-0.174	-0.146	0.026	0.0002	0.0003
STN	-0.145	-0.226	-0.063	0.022	0.0016	0.0019
GP	-0.136	-0.162	-0.110	0.019	0.0002	0.0003
GPe	-0.126	-0.154	-0.097	0.016	0.0002	0.0003
CN	-0.083	-0.100	-0.066	0.007	0.0002	0.0003
TH.P	-0.073	-0.100	-0.047	0.005	0.0002	0.0003
Pu	0.037	0.021	0.053	0.001	0.0002	0.0003
TH.MN	0.083	0.056	0.110	0.007	0.0002	0.0003
DN	0.010	0.025	0.104	0.004	0.0013	0.0021
GPI	0.233	0.173	0.291	0.057	0.0002	0.0003
HN	0.310	0.201	0.410	0.106	0.0002	0.0003
SNr	0.345	0.290	0.398	0.135	0.0002	0.0003
SN	0.420	0.377	0.461	0.214	0.0002	0.0003
SNC	0.488	0.435	0.538	0.313	0.0002	0.0003
NAC	0.587	0.550	0.621	0.525	0.0002	0.0003
RN	0.644	0.608	0.677	0.709	0.0002	0.0003
VeP	0.645	0.593	0.692	0.714	0.0002	0.0003
RN	0.543	0.608	0.677	0.418	0.0002	0.0003

We assessed the spatial correlation between multiparametric mapping-derived group differences using t-maps containing PwPD > HCs magnetic transfer saturation values and a positron emission tomography-derived D1 map. For each correlation test, we report Spearman's correlation coefficient (ρ), effect size (Cohen's f^2), nominal and false discovery rate (FDR)-adjusted p-values (p_{uncorr} and p_{FDR}). CN: caudate nucleus. DN: dentate nucleus of the cerebellum. GP (GPe/GPI): globus pallidus (external/internal). HCs: healthy controls. HN: habenular nucleus. NAC: nucleus accumbens. Pu: putamen. PwPD: patients with Parkinson's disease. RN: red nucleus. SN (SNc/SNr): substantia nigra (pars compacta/pars reticulata). STN: subthalamic nucleus. TH.AN: anterior thalamic nucleus. TH.IM: intralaminar thalamic nucleus. TH.MN: medial thalamic nucleus. TH.P: posterior thalamic nucleus. TH.VN: ventral thalamic nucleus. VeP: ventral pallidum.

Supplementary Table 13. Spatial correlations between positron emission tomography-derived map of dopamine D2 receptor (D2) and multiparametric mapping-derived Parkinson's disease-related group differences in effective transverse relaxation rate within subcortical regions.

	ρ	CI_{lower}	CI_{upper}	Cohen's f^2	p_{uncorr}	p_{FDR}
CN	-0.348	0.214	0.247	0.138	0.0002	0.0003
GPI	-0.316	-0.261	-0.142	0.111	0.0002	0.0003
NAC	-0.287	-0.524	-0.440	0.090	0.0002	0.0003
VeP	-0.237	-0.315	-0.156	0.059	0.0002	0.0003
DN	-0.082	0.097	0.175	0.007	0.0002	0.0003
TH.VN	-0.067	-0.089	-0.046	0.005	0.0002	0.0003
TH.IM	0.102	0.071	0.133	0.011	0.0002	0.0003
Thalamus	0.135	0.121	0.149	0.019	0.0002	0.0003
GP	0.150	0.124	0.176	0.023	0.0002	0.0003
TH.AN	0.166	0.104	0.226	0.028	0.0002	0.0003
RN	0.201	-0.019	-0.005	0.042	0.0002	0.0003
Pu	0.222	-0.360	-0.332	0.052	0.0002	0.0003
TH.MN	0.240	0.214	0.265	0.061	0.0002	0.0003
SNC	0.254	0.291	0.409	0.069	0.0002	0.0003
GPe	0.279	-0.012	-0.001	0.084	0.0002	0.0003
TH.P	0.378	0.355	0.401	0.167	0.0002	0.0003
SN	0.388	-0.218	-0.119	0.177	0.0002	0.0003
SNr	0.423	0.371	0.472	0.218	0.0002	0.0003
STN	0.466	0.398	0.529	0.278	0.0002	0.0003
HN	0.785	-0.651	-0.497	1.608	0.0002	0.0003

We assessed the spatial correlation between multiparametric mapping-derived group differences using t-maps containing PwPD > HCs effective transverse relaxation rate values and a positron emission tomography-derived D2 map. For each correlation test, we report Spearman's correlation coefficient (ρ), effect size (Cohen's f^2), nominal and false discovery rate (FDR)-adjusted p-values (p_{uncorr} and p_{FDR}). CN: caudate nucleus. DN: dentate nucleus of the cerebellum. GP (GPe/GPI): globus pallidus (external/internal). HCs: healthy controls. HN: habenular nucleus. Pu: putamen. PwPD: patients with Parkinson's disease. RN: red nucleus. SN (SNc/SNr): substantia nigra (pars compacta/pars reticulata). STN: subthalamic nucleus. TH.AN: anterior thalamic nucleus. TH.IM: intralaminar thalamic nucleus. TH.MN: medial thalamic nucleus. TH.P: posterior thalamic nucleus. TH.VN: ventral thalamic nucleus. VeP: ventral pallidum.

Supplementary Table 14. Spatial correlations between positron emission tomography-derived map of dopamine D2 receptor (D2) and multiparametric mapping-derived Parkinson's disease-related group differences in longitudinal relaxation rate within subcortical regions.

	ρ	CI_{lower}	CI_{upper}	Cohen's f^2	p_{uncorr}	p_{FDR}
TH.AN	-0.596	-0.635	-0.554	0.551	0.0002	0.0003
HN	-0.579	-0.651	-0.497	0.505	0.0002	0.0003
NAC	-0.483	-0.524	-0.440	0.304	0.0002	0.0003
TH.MN	-0.374	-0.397	-0.350	0.162	0.0002	0.0003
Pu	-0.346	-0.360	-0.332	0.136	0.0002	0.0003
TH.IM	-0.283	-0.312	-0.254	0.087	0.0002	0.0003
GPI	-0.203	-0.261	-0.142	0.043	0.0002	0.0003
TH.P	-0.101	-0.127	-0.074	0.010	0.0002	0.0003
Thalamus	-0.086	-0.085	-0.099	0.007	0.0002	0.0003
GP	-0.018	-0.045	0.008	<0.001	0.1724	0.1861
VeP	0.003	-0.081	0.087	<0.001	0.9528	0.9528
GPe	0.016	-0.012	0.045	<0.001	0.2739	0.2899
RN	0.040	-0.019	0.099	0.002	0.1800	0.1929
TH.VN	0.089	0.067	0.110	0.008	0.0002	0.0003
DN	0.136	0.097	0.175	0.019	0.0002	0.0003
CN	0.231	0.214	0.247	0.056	0.0002	0.0003
STN	0.258	0.179	0.334	0.071	0.0002	0.0003
SNC	0.351	0.291	0.409	0.141	0.0002	0.0003
SN	0.436	0.394	0.476	0.235	0.0002	0.0003
SNr	0.459	0.404	0.501	0.267	0.0002	0.0003

We assessed the spatial correlation between multiparametric mapping-derived group differences using t-maps containing PwPD > HCs longitudinal relaxation rate values and a positron emission tomography-derived D2 map. For each correlation test, we report Spearman's correlation coefficient (ρ), effect size (Cohen's f^2), nominal and false discovery rate (FDR)-adjusted p-values (p_{uncorr} and p_{FDR}). CN: caudate nucleus. DN: dentate nucleus of the cerebellum. GP (GPe/GPI): globus pallidus (external/internal). HCs: healthy controls. HN: habenular nucleus. NAC: nucleus accumbens. Pu: putamen. PwPD: patients with Parkinson's disease. RN: red nucleus. SN (SNC/SNr): substantia nigra (pars compacta/pars reticulata). STN: subthalamic nucleus. TH.AN: anterior thalamic nucleus. TH.IM: intralaminar thalamic nucleus. TH.MN: medial thalamic nucleus. TH.P: posterior thalamic nucleus. TH.VN: ventral thalamic nucleus. VeP: ventral pallidum.

Supplementary Table 14. Spatial correlations between positron emission tomography-derived map of dopamine D2 receptor (D2) and multiparametric mapping-derived Parkinson's disease-related group differences in proton density within subcortical regions.

	rho	CI_{lower}	CI_{Upper}	Cohen's f^2	p_{uncorr}	p_{FDR}
HN	-0.493	-0.575	-0.400	0.321	0.0002	0.0003
Thalamus	-0.454	-0.465	-0.443	0.259	0.0002	0.0003
GPe	-0.408	-0.431	-0.383	0.199	0.0002	0.0003
GP	-0.387	-0.410	-0.364	0.177	0.0002	0.0003
SNc	-0.371	-0.428	-0.312	0.160	0.0002	0.0003
TH.IM	-0.313	-0.341	-0.285	0.109	0.0002	0.0003
TH.VN	-0.213	-0.233	-0.192	0.047	0.0002	0.0003
TH.MN	-0.188	-0.214	-0.161	0.037	0.0002	0.0003
TH.P	-0.126	-0.152	-0.099	0.016	0.0002	0.0003
GPI	-0.102	-0.163	-0.040	0.011	0.0018	0.0021
RN	-0.019	-0.077	0.041	<0.001	0.5365	0.5570
DN	0.025	-0.014	0.065	0.001	0.1996	0.2134
CN	0.063	0.046	0.080	0.004	0.0002	0.0003
VeP	0.066	-0.018	0.148	0.004	0.1260	0.1374
Pu	0.139	0.123	0.155	0.020	0.0002	0.0003
TH.AN	0.284	0.138	0.259	0.088	0.0002	0.0003
STN	0.258	0.206	0.359	0.071	0.0002	0.0003
NAC	0.385	0.337	0.430	0.175	0.0002	0.0003
SNr	0.452	0.402	0.499	0.257	0.0002	0.0003
SN	0.458	0.417	0.568	0.266	0.0002	0.0003

We assessed the spatial correlation between multiparametric mapping-derived group differences using t-maps containing PwPD > HCs proton density values and a positron emission tomography-derived D2 map. b For each correlation test, we report Spearman's correlation coefficient (rho), effect size (Cohen's f^2), nominal and false discovery rate (FDR)-adjusted p-values (p_{uncorr} and p_{FDR}). CN: caudate nucleus. DN: dentate nucleus of the cerebellum. GP (GPe/GPi): globus pallidus (external/internal). HCs: healthy controls. HN: habenular nucleus. NAC: nucleus accumbens. Pu: putamen. PwPD: patients with Parkinson's disease. RN: red nucleus. SN (SNc/SNr): substantia nigra (pars compacta/pars reticulata). STN: subthalamic nucleus. TH.AN: anterior thalamic nucleus. TH.IM: intralaminar thalamic nucleus. TH.MN: medial thalamic nucleus. TH.P: posterior thalamic nucleus. TH.VN: ventral thalamic nucleus. VeP: ventral pallidum.

Supplementary Table 16. Spatial correlations between positron emission tomography-derived map of dopamine D2 receptor (D2) and multiparametric mapping-derived Parkinson's disease-related group differences in magnetic transfer saturation within subcortical regions.

	rho	CI_{lower}	CI_{Upper}	Cohen's f^2	p_{uncorr}	p_{FDR}
HN	-0.665	-0.725	-0.595	0.793	0.0002	0.0003
TH.AN	-0.543	-0.586	-0.497	0.418	0.0002	0.0003
GPe	-0.341	-0.366	-0.315	0.131	0.0002	0.0003
GP	-0.326	-0.349	-0.302	0.119	0.0002	0.0003
TH.MN	-0.253	-0.279	-0.227	0.069	0.0002	0.0003
Thalamus	-0.119	-0.133	-0.105	0.014	0.0002	0.0003
Pu	-0.108	-0.123	-0.092	0.012	0.0002	0.0003
TH.IM	-0.042	-0.073	-0.011	0.002	0.0088	0.0100
RN	-0.038	-0.097	0.021	0.001	0.2154	0.2297
GPI	-0.010	-0.072	0.052	<0.001	0.7429	0.7568
DN	0.065	0.025	0.050	0.004	0.0018	0.0021
TH.P	0.091	0.065	0.118	0.008	0.0002	0.0003
STN	0.154	0.072	0.234	0.024	0.0004	0.0005
NAC	0.178	0.124	0.230	0.033	0.0002	0.0003
CN	0.196	0.179	0.212	0.040	0.0002	0.0003
TH.VN	0.201	0.180	0.221	0.042	0.0002	0.0003
SNC	0.361	0.301	0.418	0.150	0.0002	0.0003
VeP	0.408	0.336	0.476	0.200	0.0002	0.0003
SN	0.443	0.402	0.483	0.245	0.0002	0.0003
SNr	0.471	0.422	0.517	0.285	0.0002	0.0003

We assessed the spatial correlation between multiparametric mapping-derived group differences using t-maps containing PwPD > HCs magnetic transfer saturation values and a positron emission tomography-derived D2 map. For each correlation test, we report Spearman's correlation coefficient (rho), effect size (Cohen's f^2), nominal and false discovery rate (FDR)-adjusted p-values (p_{uncorr} and p_{FDR}). CN: caudate nucleus. DN: dentate nucleus of the cerebellum. GP (GPe/GPI): globus pallidus (external/internal). HCs: healthy controls. HN: habenular nucleus. NAC: nucleus accumbens. Pu: putamen. PwPD: patients with Parkinson's disease. RN: red nucleus. SN (SNC/SNr): substantia nigra (pars compacta/pars reticulata). STN: subthalamic nucleus. TH.AN: anterior thalamic nucleus. TH.IM: intralaminar thalamic nucleus. TH.MN: medial thalamic nucleus. TH.P: posterior thalamic nucleus. TH.VN: ventral thalamic nucleus. VeP: ventral pallidum.

Supplementary Table 17. Spatial correlations between positron emission tomography-derived map of dopamine transporter (DAT) and multiparametric mapping-derived Parkinson's disease-related group differences within the Human Motor Template Area (HMT) and whole brain gray matter (WBGM).

	rho	CI_{lower}	CI_{Upper}	Cohen's f²	p_{uncorr}	p_{FDR}
R2*						
SMA	-0.208	-0.221	-0.196	0.045	<0.0001	0.0003
PMd	-0.165	-0.173	-0.156	0.028	<0.0001	0.0003
M1	-0.112	-0.119	-0.104	0.013	<0.0001	0.0003
preSMA	-0.092	-0.106	-0.077	0.008	<0.0001	0.0003
S1	-0.068	-0.078	-0.057	0.005	<0.0001	0.0003
PMv	0.039	0.048	0.001	0.001	<0.0001	0.0003
WBGM	0.072	0.065	0.078	0.010	<0.0001	0.0003
R1						
preSMA	-0.319	-0.332	-0.305	0.113	<0.0001	0.0003
PMd	-0.271	-0.279	-0.263	0.079	<0.0001	0.0003
SMA	-0.178	-0.191	-0.165	0.033	<0.0001	0.0003
M1	-0.082	-0.090	-0.074	0.007	<0.0001	0.0003
S1	-0.040	-0.051	-0.030	0.002	<0.0001	0.0003
PMv	-0.038	-0.047	-0.029	0.001	<0.0001	0.0003
WBGM	0.013	-0.007	0.028	<0.001	0.1780	0.1912
Proton density						
SMA	-0.841	-0.844	-0.837	2.417	<0.0001	0.0003
preSMA	-0.800	-0.803	-0.796	1.784	<0.0001	0.0003
PMd	-0.214	-0.222	-0.206	0.048	<0.0001	0.0003
M1	-0.198	-0.206	-0.190	0.041	<0.0001	0.0003
S1	-0.184	-0.194	-0.173	0.035	<0.0001	0.0003
PMv	-0.181	-0.189	-0.172	0.034	<0.0001	0.0003
WBGM	-0.038	-0.043	-0.035	<0.001	<0.0001	0.0003
MTsat						
preSMA	-0.483	-0.494	-0.471	0.304	0.0002	0.0003
SMA	-0.404	-0.414	-0.392	0.232	0.0002	0.0003
PMd	-0.053	-0.061	-0.044	0.003	0.0002	0.0003
S1	-0.015	-0.026	-0.005	<0.001	0.0002	0.0003
M1	0.008	<-0.001	0.016	<0.001	0.0576	0.0639
PMv	0.022	0.013	0.031	<0.001	0.0002	0.0003
WBGM	0.054	0.049	0.067	<0.001	<0.0001	0.0003

We assessed the spatial correlation between multiparametric mapping-derived group differences using t-maps containing PwPD > HCs values and a positron emission tomography-derived DAT map. For each correlation test, we report Spearman's correlation coefficient (rho), effect size (Cohen's f²), nominal and false discovery rate (FDR)-adjusted p-values (p_{uncorr} and p_{FDR}). HCs: healthy controls. M1: primary motor cortex. MTsat: magnetic transfer saturation. PMd/v: dorsal/ventral premotor cortex. PwPD: patients with Parkinson's disease. R1: longitudinal relaxation rate. R2*: effective transverse relaxation rate. S1: primary somatosensory cortex. SMA: supplementary motor area.

Supplementary Table 18. Spatial correlations between the positron emission tomography-derived map of 6-[¹⁸F]fluoro-L-DOPA (FDOPA) and multiparametric mapping-derived Parkinson's disease-related group differences within the Human Motor Template Area (HMT) and whole brain gray matter (WBGm).

	rho	CI_{lower}	CI_{Upper}	Cohen's f²	p_{uncorr}	p_{FDR}
R2*						
preSMA	-0.263	-0.276	-0.249	0.074	0.0002	0.0003
PMd	-0.219	-0.227	-0.211	0.050	0.0002	0.0003
SMA	-0.161	-0.174	-0.148	0.027	0.0002	0.0003
S1	0.018	0.007	0.028	<0.001	0.0012	0.0014
M1	0.025	0.017	0.033	0.001	0.0002	0.0003
PMv	0.074	0.064	0.083	0.005	0.8902	0.8943
WBGm	0.125	0.117	0.132	0.020	<0.0001	0.0002
R1						
preSMA	-0.441	-0.453	-0.429	0.242	0.0002	0.0003
PMd	-0.381	-0.388	-0.374	0.170	0.0002	0.0003
M1	-0.180	-0.188	-0.172	0.034	0.0002	0.0003
SMA	-0.157	-0.170	-0.144	0.025	0.0002	0.0003
S1	-0.090	-0.101	-0.080	0.008	0.0002	0.0003
PMv	-0.001	-0.010	0.008	<0.001	0.8176	0.8290
WBGm	0.034	0.023	0.038	<0.001	0.0007	0.0008
Proton density						
preSMA	-0.651	-0.659	-0.642	0.735	0.0002	0.0003
SMA	-0.522	-0.532	-0.512	0.375	0.0002	0.0003
PMv	-0.110	-0.119	-0.101	0.012	0.0002	0.0003
PMd	-0.064	-0.072	-0.055	0.004	0.0002	0.0003
S1	-0.008	-0.019	0.002	<0.001	0.1250	0.1267
WBGm	0.002	-0.028	0.005	<0.001	0.8642	0.8702
M1	0.043	0.034	0.050	0.002	0.0002	0.0003
MTsat						
preSMA	-0.536	-0.546	-0.525	0.402	0.0002	0.0003
SMA	-0.245	-0.257	-0.232	0.064	0.0002	0.0003
PMd	-0.143	-0.151	-0.135	0.021	0.0002	0.0003
M1	-0.036	-0.044	-0.028	0.001	0.0002	0.0003
PMv	-0.003	0.013	0.020	<0.001	0.0170	0.0192
WBGm	0.034	0.055	0.060	<0.001	0.0006	0.0007
S1	0.054	0.043	0.064	0.003	0.0002	0.0003

We assessed the spatial correlation between multiparametric mapping-derived group differences using t-maps containing PwPD > HCs values and a positron emission tomography-derived FDOPA map. For each correlation test, we report Spearman's correlation coefficient (rho), effect size (Cohen's f²), nominal and false discovery rate (FDR)-adjusted p-values (p_{uncorr} and p_{FDR}). HCs: healthy controls. M1: primary motor cortex. MTsat: magnetic transfer saturation. PMd/v: dorsal/ventral premotor cortex. PwPD: patients with Parkinson's disease. R1: longitudinal relaxation rate. R2*: effective transverse relaxation rate. S1: primary somatosensory cortex. SMA: supplementary motor area.

Supplementary Table 19. Spatial correlations between the positron emission tomography-derived map of dopamine D1 receptor (D1) and multiparametric mapping-derived Parkinson's disease-related group differences within the Human Motor Template Area (HMT) and whole brain gray matter (WBG).

	rho	CI_{lower}	CI_{Upper}	Cohen's f²	p_{uncorr}	p_{FDR}
R2*						
PMd	-0.170	-0.162	0.030	0.030	0.0002	0.0003
preSMA	-0.166	-0.181	-0.152	0.028	0.0002	0.0003
SMA	-0.137	-0.149	-0.123	0.019	0.0002	0.0003
M1	-0.058	-0.065	-0.049	0.003	0.0002	0.0003
PMv	-0.018	-0.027	-0.008	<0.001	0.0004	0.0005
S1	-0.018	-0.028	-0.007	<0.001	0.0012	0.0014
WBG	0.115	0.108	0.120	0.010	<0.0001	0.0003
R1						
preSMA	-0.385	-0.397	-0.372	0.174	0.0002	0.0003
PMd	-0.357	-0.364	-0.350	0.146	0.0002	0.0003
M1	-0.240	-0.247	-0.232	0.061	0.0002	0.0003
SMA	-0.176	-0.189	-0.163	0.032	0.0002	0.0003
PMv	-0.144	-0.153	-0.135	0.021	0.0002	0.0003
S1	-0.131	-0.141	-0.121	0.018	0.0002	0.0003
WBG	0.015	-0.045	0.020	<0.001	0.1287	0.1400
Proton density						
preSMA	-0.591	-0.600	-0.581	0.537	0.0002	0.0003
SMA	-0.491	-0.501	-0.480	0.317	0.0002	0.0003
PMd	-0.035	-0.043	-0.026	0.001	0.0002	0.0003
WBG	0.029	0.020	0.031	<0.001	0.0041	0.0047
S1	0.034	0.023	0.045	0.001	0.0002	0.0003
M1	0.109	0.101	0.117	0.012	0.0002	0.0003
PMv	0.180	0.171	0.188	0.033	0.0002	0.0003
MTsat						
preSMA	-0.428	-0.440	-0.416	0.225	0.0002	0.0003
SMA	-0.308	-0.320	-0.295	0.105	0.0002	0.0003
PMv	-0.131	-0.140	-0.122	0.018	0.0002	0.0003
PMd	-0.080	-0.082	-0.071	0.006	0.0002	0.0003
M1	-0.054	-0.062	-0.046	0.003	0.0002	0.0003
WBG	0.029	0.024	0.035	<0.001	0.0039	0.0045
S1	0.033	0.022	0.043	0.001	0.0002	0.0003

We assessed the spatial correlation between multiparametric mapping-derived group differences using t-maps containing PwPD > HCs values and a positron emission tomography-derived D1 map. For each correlation test, we report Spearman's correlation coefficient (rho), effect size (Cohen's f²), nominal and false discovery rate (FDR)-adjusted p-values (p_{uncorr} and p_{FDR}). HCs: healthy controls. M1: primary motor cortex. MTsat: magnetic transfer saturation. PMd/v: dorsal/ventral premotor cortex. PwPD: patients with Parkinson's disease. R1: longitudinal relaxation rate. R2*: effective transverse relaxation rate. S1: primary somatosensory cortex. SMA: supplementary motor area.

Supplementary Table 20. Spatial correlations between the positron emission tomography-derived map of dopamine D2 receptor (D2) and multiparametric mapping-derived Parkinson's disease-related group differences within the Human Motor Template Area (HMT) and whole brain gray matter (WBGm).

	rho	CI_{lower}	CI_{Upper}	Cohen's f²	p_{uncorr}	p_{FDR}
R2*						
preSMA	-0.181	-0.195	-0.167	0.034	0.0002	0.0003
M1	-0.105	-0.112	-0.097	0.011	0.0002	0.0003
SMA	-0.079	-0.092	-0.066	0.006	0.0002	0.0003
PMv	-0.073	-0.082	-0.064	0.005	0.0004	0.0005
PMd	-0.031	-0.039	-0.022	0.001	0.0002	0.0003
WBGm	0.091	0.077	0.101	0.010	<0.0001	0.0003
S1	0.155	0.144	0.165	0.024	0.0002	0.0003
R1						
PMd	-0.314	-0.321	-0.306	0.109	0.0002	0.0003
preSMA	-0.357	-0.370	-0.351	0.146	0.0002	0.0003
M1	-0.201	-0.209	-0.193	0.042	0.0002	0.0003
PMv	-0.100	-0.109	-0.091	0.010	0.0002	0.0003
WBGm	-0.019	-0.026	0.001	0.009	0.0565	0.0628
SMA	0.021	0.007	0.034	<0.001	0.0030	0.0035
S1	0.055	0.044	0.065	0.003	0.0002	0.0003
Proton density						
preSMA	-0.290	-0.304	-0.277	0.092	0.0002	0.0003
SMA	-0.261	-0.273	-0.248	0.073	0.0002	0.0003
S1	-0.021	-0.021	-0.031	<0.001	0.0002	0.0003
WBGm	0.036	0.052	0.057	0.009	0.0003	0.0004
M1	0.170	0.162	0.178	0.030	0.0002	0.0003
PMv	0.183	0.175	0.192	0.035	0.0002	0.0003
PMd	0.184	0.176	0.193	0.035	0.0002	0.0003
MTsat						
preSMA	-0.294	-0.307	-0.280	0.095	0.0002	0.0003
PMv	-0.186	-0.195	-0.178	0.036	0.0002	0.0003
M1	-0.115	-0.123	-0.107	0.013	0.0002	0.0003
SMA	-0.097	-0.110	-0.084	0.009	0.0002	0.0003
PMd	-0.073	-0.082	-0.065	0.005	0.0002	0.0003
WBGm	0.065	0.051	0.073	0.009	<0.0001	0.0003
S1	0.100	0.090	0.110	0.010	0.0002	0.0003

We assessed the spatial correlation between multiparametric mapping-derived group differences using t-maps containing PwPD > HCs values and a positron emission tomography-derived D2 map. For each correlation test, we report Spearman's correlation coefficient (rho), effect size (Cohen's f²), nominal and false discovery rate (FDR)-adjusted p-values (p_{uncorr} and p_{FDR}). HCs: healthy controls. M1: primary motor cortex. MTsat: magnetic transfer saturation. PMd/v: dorsal/ventral premotor cortex. PwPD: patients with Parkinson's disease. R1: longitudinal relaxation rate. R2*: effective transverse relaxation rate. S1: primary somatosensory cortex. SMA: supplementary motor area.