Network-based disease fingerprinting with neuroinflammation PET imaging

Supplementary materials

S.1 Top network edges according to logistic regression coefficients for disease classification

Traumatic brain injury	Multiple sclerosis	Chronic low back pain
1. Lateral orbitofrontal area R ~ Lateral orbitofrontal area L (-0.15) 2. Medial orbitofrontal area L ~ Brainstem (0.13) 3. Rostral anterior cingulate area L ~ Putamen L (-0.11) 4. Medial orbitofrontal area L ~ Bankssts area L (-0.10) 5. Superior parietal area R ~ Paracentral area R (-0.09)	1. Putamen R ~ Caudate L (-0.06) 2. Rostral anterior cingulate area L ~ Accumbens area R (0.06) 3. Lingual area L ~ Cuneus area L (0.06) 4. Putamen R ~ Hippocampus L (-0.06) 5. Putamen L ~ Caudate L (-0.06)	1. Parahippocampal area L ~ Brainstem (-0.10) 2. Lateral occipital area R ~ Bankssts area L (-0.09) 3. Entorhinal area L ~ Ventral diencephalon L (0.09) 4. Temporal pole area R ~ Caudal anterior cingulate area R (0.09) 5. Rostral anterior cingulate area L ~ Precentral area L (0.08)
Schizophrenia	**Depression**	
1. Ventral diencephalon R ~ Amygdala L 2. (-0.10) 3. Precuneus area L ~ Putamen L (0.10) 4. Supramarginal area R ~ Caudal middle frontal area L (-0.10) 5. Pars triangularis area R ~ Rostral anterior cingulate area L (0.10) 6. Putamen R ~ Hippocampus L (-0.09)	1. Lateral occipital area L ~ Putamen R (0.20) 2. Temporal pole area R ~ Ventral diencephalon R (-0.16) 3. Pars opercularis area R ~ Rostral anterior cingulate area L (0.16) 4. Insula area R ~ Pars opercularis area L (0.15) 5. Pars triangularis area R ~ Pars orbitalis area R (-0.15)	

Figure S1. Top network edges for disease classification. For each disease-specific classifier, the figure shows the five edges with the largest absolute logistic regression coefficients. Positive coefficients (green) indicate higher similarity between the two regions in the patient group, whereas negative coefficients (red) indicate lower similarity in the disease group. Acronyms: L, left; R, right.

S.2 Multiclass disease classifier

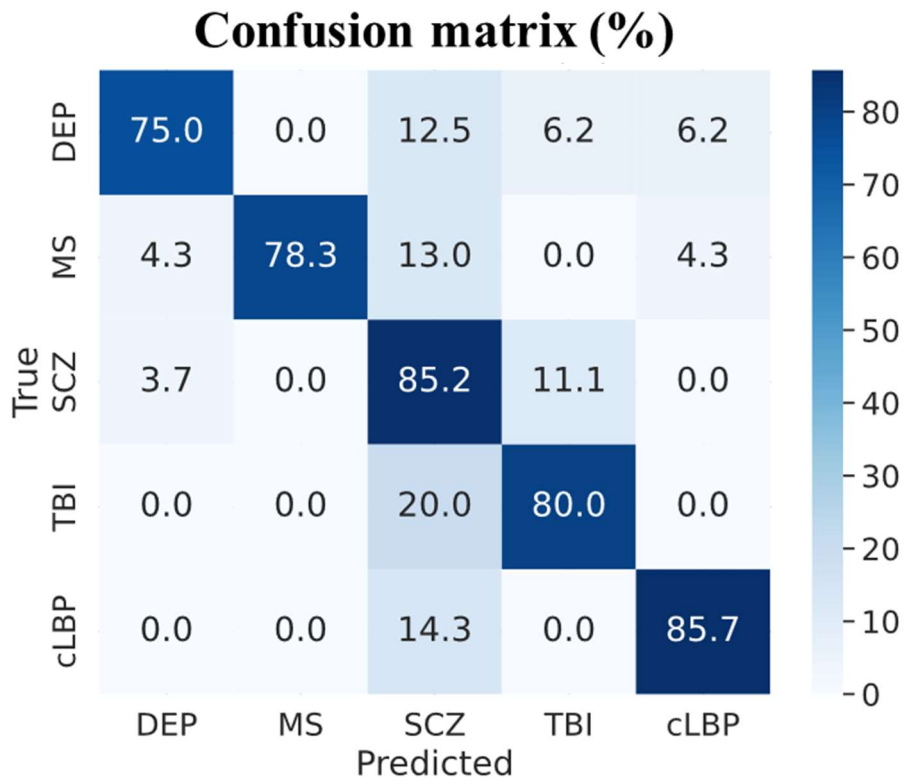

Figure S2. Multiclass disease classification performance. The figure illustrates the confusion matrix of test-set results from a multiclass logistic regression model. The model achieved a balanced accuracy [95% confidence interval] of 80.8 [67.6, 90.3] %, well above the 20% chance level. Acronyms: DEP, depression; MS, multiple sclerosis; SCZ, schizophrenia; TBI, traumatic brain injury; cLBP, chronic low back pain.

S.3 Site-specific classification models and comparison with corresponding multi-site models

			Classification performance		*Correlation of classifier β*	
Group	**Tracer**	**Site/dataset**	**AP [95% CI]**	**CL**	**Kendall τ**	**P**
SCZ	[^{11}C]-PBR28	KCL/ICL	0.79 [0.57, 0.96]	0.55	0.15	<0.001
SCZ	[^{11}C]-PBR28	UBC	0.87 [0.62, 1.00]	0.43	0.11	<0.001
FEP (SCZ)	[^{18}F]-DPA714	KCL	0.79 [0.65, 0.96]	0.61	0.37	<0.001
MS	[^{18}F]-DPA714	ICM (INNMS)	0.91 [0.79, 0.99]	0.71	0.19	<0.001
MS	[^{18}F]-DPA714	ICM (INFLASEP)	0.92 [0.83, 0.99]	0.69	0.12	<0.001
cLBP	[^{11}C]-PBR28	MGH (Bay 6)	0.71 [0.50, 0.91]	0.50	0.09	<0.001

Table S3. Performance of site-specific classification models and comparison with corresponding multi-site models. The table reports the classification performance of the site-specific models and the Kendall's tau correlation between their β coefficients and those of the corresponding multi-site model. Acronyms: SCZ, schizophrenia; FEP, first-episode psychosis; MS, multiple sclerosis; cLBP, chronic low back pain; KCL, King's college London; ICL, Imperial College London; UBC, University of British Columbia; ICM, Paris Brain Institute (INNMS and INFLASEP indicate the two studies); MGH, Massachusetts General Hospital (Bay 6 indicates the scanner); AP, average precision; CL, average precision chance level.