Supplementary Information

Supplementary Table S1. Multivariable regression model for the correlations between disease duration with plasma extracellular vesicle (EV) neurofilament light chain (NfL) adjusted for age in Parkinson's disease (PD) patients.

	β	*p*-value
Age	0.044±0.029	0.14
Plasma EV NfL	0.113±0.066	0.09

*β, coefficient estimate

Supplementary Table S2. Multivariable regression model for the correlations between akinetic rigidity score with plasma extracellular vesicle (EV) neurofilament light chain (NfL) adjusted for age in Parkinson's disease (PD) patients.

	β	*p*-value
Age	0.009±0.005	0.05
Plasma EV NfL	0.021±0.011	0.05

*β, coefficient estimate

Supplementary Table S3 Analysis of covariance (ANCOVA) with Dunnett's post-hoc analysis to compare the Unified Parkinson's Disease Rating Scale (UPDRS)-III and akinetic rigidity score according the plasma extracellular vesicle (EV) neurofilament light chain (NfL) quartile subgroup after the adjustment of age, sex, and disease duration in Parkinson's disease (PD) patients.

Plasma EV NfL	UPDRS-III	*p* value	Akinetic rigidity score	*p* value
Q1	18.38±9.74	(ref)	0.76±0.34	(ref)
Q2	23.71±10.67	0.092	1.00±0.42	0.080
Q3	24.61±7.72	0.086	1.03±0.41	0.075
Q4	23.30±10.26	0.115	1.03±0.49	0.057

Supplementary Table S4 One-way analysis of variance (ANOVA) compares the plasma extracellular vesicle (EV) neurofilament light chain (NfL) quartile-stratified age and disease duration in Parkinson's disease (PD) patients. No significant difference was detected in the Dunnett's post-hoc analysis compared with Q1.

Plasma EV NfL	Q1	Q2	Q3	Q4	p for trend
Age (year-old)	68.86±8.59	70.00±8.18	68.61±7.95	71.10±9.04	0.66
Disease duration (years)	2.62±2.37	2.38±3.21	2.51±2.10	3.29±2.14	0.55

Data was presented as mean± standard deviation

Supplementary Table S5 Pearson's chi-squared test to compare the plasma extracellular vesicle (EV) neurofilament light chain (NfL) quartile-stratified sex distribution in Parkinson's disease (PD) patients.

Plasma EV NfL	Q1	Q2	Q3	Q4	p-value
Male	15	17	17	13	0.54
Female	14	12	11	17	

Supplementary Table S6. Multivariable regression model for the correlations between optimal plasma extracellular vesicle (EV) neurofilament light chain (NfL) (Q1) and Unified Parkinson's Disease Rating Scale (UPDRS)-III adjusted for age, sex, and disease duration in Parkinson's disease (PD) patients.

|	β	p-value
Age	0.746±1.797	0.679
Sex (female as reference)	0.232±0.113	0.042
Disease duration	0.431±0.366	0.242
Plasma EV NfL (Q1 as reference)	6.67±2.08	0.002

*β, coefficient estimate

Supplementary Table S7. Multivariable regression model for the correlations between optimal plasma extracellular vesicle (EV) neurofilament light chain (NfL) (Q1) and akinetic rigidity score adjusted age, sex, and disease duration in Parkinson's disease (PD) patients.

	β	*p*-value
Age	0.024±0.079	0.765
Sex (female as reference)	0.0.13±0.005	0.014
Disease duration	0.014±0.016	0.391
Plasma EV NfL (Q1 as reference)	0.277±0.092	0.003

*β, coefficient estimate

Supplementary Figure 1. The distribution of plasma extracellular vesicle (EV) neurofilament light chain (NfL) in non-PD, neurological controls and Parkinson's disease (PD) patients.
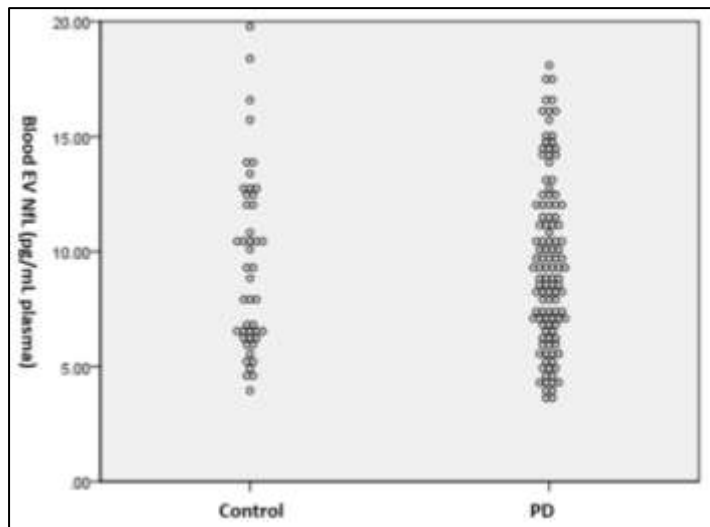
Supplementary Figure 2. The scatter plot of the association between plasma extracellular vesicle (EV) neurofilament light chain (NfL) with different variables, including age, disease duration, Unified Parkinson's Disease Rating Scale (UPDRS)-III scores, akinetic rigidity score, tremor score, mini-mental state examination (MMSE) and Montreal Cognitive Assessment (MoCA) among Parkinson's disease (PD) patients. r, correlation coefficient. Statistical analysis was conducted by Spearman's rank correlation.