Clin. Lab. 2026;72:1-2

ORIGINAL ARTICLE

Correlation of Plasma Neuropeptide Y with Specific Cognitive Domains in Patients with Parkinson's Disease Cognitive Impairment

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SUMMARY

Background: **We aimed to investigate the correlation of plasma neuropeptide Y (NPY) with specific cognitive domains in patients with Parkinson's disease (PD) cognitive impairment (CI).**
Methods: **The study included thirty-six PD patients with normal cognitive function (PD-NC), 57 PD patients with mild cognitive impairment (PD-MCI), 30 PD patients with dementia (PDD), and 46 healthy individuals. Every patient underwent thorough clinical evaluations and neuropsychological examinations. Plasma NPY expression was assessed using ELISA. The effects of plasma NYP levels on PD-CI events or PDD were analyzed using univariate and multivariate logistic models. Multiple linear regression analyses were constructed to assess the independent associations of plasma NYP levels with z scores in 5 cognitive domains.**
Results: **Plasma NYP levels were reduced in patients with PD compared with healthy controls ($p < 0.001$). Plasma NYP levels were the highest in PD-NC patients and decreased with increasing CI, with the PDD group having the lowest plasma NYP levels. Multivariate logistic regression adjusted for years of education and UPDRS-III subscores showed a significant correlation between NYP and CI ($p = 0.005$). Plasma NYP was significantly correlated with a linear model between each of the 5 cognitive domains, including attention, executive function, language, memory, and visuospatial function.**
Conclusions: **Reduced plasma NPY levels are associated with CI in PD patients and are strongly correlated with 5 cognitive domains.**
(Clin. Lab. 2026;72:1-2. DOI: 10.7754/Clin.Lab.2025.250237)

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Manuscript accepted April 28, 2025

Supplementary Data

Table S1. Specific cognitive domains in 80 healthy controls.

Cognitive test	Mean	SD
Cognitive test		
MMSE	26.94	1.92
Attention and working memory		
SDMT	32.36	13.21
TMT-A, seconds	46.85	26.98
Executive function		
CWT-C time (seconds)	76.68	20.36
CWT-C right	45.61	3.16
TMT-B (seconds)	118.64	56.36
Language		
BNT	23.85	3.25
AFT	19.25	3.48
Memory		
AVLT-delay recall	5.89	1.36
AVLT-T	28.65	6
CFT-delay recall	16.05	4.25
Visuospatial function		
CFT	31.69	3.64
CDT	24.12	6.61

PDD Parkinson's disease with dementia, MMSE mini mental state examination, SDMT symbol digit modality test, TMT trail making test, CWT Stroop color-word test, BNT Boston naming test, AFT animal fluency test, AVLT auditory verbal learning test, CFT Rey-Osterrieth complex figure test, CDT clock drawing test.

Table S2. Correlation analysis between plasma NYP and non-motor symptoms in Parkinson's patients.

Non-motor symptoms	Person/Spearman	p	p adjusted
NMSS total score	-0.205	0.064	0.267
NMSS subtests score			
Cardiovascular	-0.152	0.215	0.358
Sleep/Fatigue	-0.285	0.08	0.267
Mood/Apathy	-0.109	0.573	0.71625
Perceptual problems/Hallucinations	-0.085	0.657	0.73
Attention/Memory	-0.298	0.023	0.23
Gastrointestinal	-0.114	0.156	0.312
Urinary	-0.157	0.567	0.716
Sexual	0.105	0.842	0.842
Miscellaneous	-0.152	0.129	0.312

Correlation analysis was performed using Pearson test (normal distribution) or Spearman test (skewed distribution). The results are shown as correlation coefficients. $p < 0.05$ was statistically significant.