

Supplementary Material 3

Assessment of outcomes in motor scales, gait parameters, and non-motor symptoms

All subjects underwent comprehensive Parkinson's disease (PD) evaluation including history taking, neurological examination, determination of Hoehn and Yahr stage,⁷ and motor function severity. The degree of motor function severity was quantified using the Unified Parkinson's Disease Rating Scale (UPDRS).⁶ For consistent evaluation, we always assessed the UPDRS at 9:00 am. Balance and gait function were assessed using the Tinetti scale, which includes 17 items. The items were divided into two domains: balance (9 items, 16 points) and gait (8 items, 12 points). The scores on the Tinetti scale range from 0–28, with higher scores indicating better balance and gait function.^{8,9}

All subjects underwent comprehensive gait evaluation regarding spatial and temporal parameters of gait dynamics using the GAITRite system (CIR System Inc., Franklin, NJ, USA) with a 4.6-meter-long walkway. Average spatiotemporal parameters such as gait velocity, cadence, step length, and step length covariance were calculated after the subject walked forward 10 times.

Non-motor symptoms were assessed using the Non-Motor Symptoms Scale (NMSS), which contains 30 items. The scores on the NMSS range from 0–360, with higher scores indicating higher severity and frequency of non-motor symptoms.¹⁰ Depression was assessed using the Montgomery-Asberg Depression Rating Scale (MADRS), which includes 10 items, each scored from 0–6 points. The total score on the MADRS ranges from 0–60, with higher scores indicating more severe depression.¹¹ Quality of life (QoL) of patients with PD was assessed using the Parkinson's Disease Questionnaire-39 (PDQ-39), which is composed of 39 items to cover the eight domains of mobility, activities of daily living, emotional well-being, stigma, social support, cognition, communication, and body discomfort. The scores on the PDQ-39 range from 0–100, with higher scores indicating poor QoL.¹²