

# Pedunculopontine Nucleus Stimulation Improves Gait Freezing in Parkinson Disease

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Abstract

## **BACKGROUND:**

Pedunculopontine nucleus (PPN) stimulation is a novel therapy for Parkinson disease. However, controversies remain regarding the clinical application of this new therapy, including patient selection, electrode positioning, and how best to assess outcomes.

## **OBJECTIVE:**

To clarify the clinical application of PPN stimulation in Parkinson disease.

## **METHODS:**

Five consecutive patients with Parkinson disease complicated by severe gait freezing, postural instability, and frequent falls (all persisting even while the patient was on medication) received bilateral stimulation of the mid-lower PPN without costimulation of other brain targets. Outcomes were assessed prospectively over 2 years with gait-specific questionnaires and the Unified Parkinson Disease Rating Scale (part III).

## **RESULTS:**

The primary outcome, the Gait and Falls Questionnaire score, improved significantly with stimulation. Benefits were maintained over 2 years. Unified Parkinson Disease Rating Scale (part III) items assessing gait and posture were relatively insensitive to these treatment effects. Beneficial effects often appeared to outlast stimulation for hours or longer. Thus, single-session on- vs off-stimulation assessments may be susceptible to “delayed washout effects.” Stimulation of the PPN did not change akinesia scores or dopaminergic medication requirements.

## **CONCLUSION:**

Bilateral stimulation of the mid-lower PPN (more caudal than previous reports) without costimulation of other brain targets may be beneficial for the subgroup of patients with Parkinson disease who experience severe gait freezing and postural instability with frequent falls, which persist even while on medication. Choosing appropriate outcome measures and accounting for the possibility of prolonged stimulation washout effects appear to be important for detecting the clinical benefits.

