



## Author

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## Title

**Pedunclopontine nucleus stimulation improves gait freezing in Parkinson's disease.**

*Neurosurgery. June 2011*

## Abstract

### **Background:**

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

### **Objectives**

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

### **Methods:**

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

### **Results:**

The primary outcome, Gait and Falls Questionnaire score, improved significantly with stimulation. Benefits were maintained over two years. Unified Parkinson's 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' versus 'off' stimulation assessments may be susceptible to 'delayed washout effects'. PPN stimulation did not change akinesia scores or dopaminergic medication requirements.

### **Conclusions:**

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

## Title

**Pedunclopontine nucleus deep brain stimulation produces sustained improvement in primary progressive freezing of gait.**

*Neurosurgery. October 2010*

## Abstract

**Objective** To assess the efficacy of bilateral pedunclopontine nucleus (PPN) deep brain stimulation (DBS) as a treatment for primary progressive freezing of gait (PPFG). **Methods** A patient with PPFG underwent bilateral PPN-DBS and was followed clinically for over 14&nbsp;months. **Results** The PPFG patient exhibited a robust improvement in gait and posture following PPN-DBS. When PPN stimulation was deactivated, postural stability and gait skills declined to pre-DBS levels, and fluoro-2-deoxy-d-glucose positron emission tomography revealed hypoactive cerebellar and brainstem regions, which significantly normalised when PPN stimulation was reactivated. **Conclusions** This case demonstrates that the advantages of PPN-DBS may not be limited to addressing freezing of gait (FOG) in idiopathic Parkinson's disease. The PPN may also be an effective DBS target to address other forms of central gait failure.