



# Temporal Course of the Motor Effects of Subthalamic DBS After Stopping Stimulation

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## INTRODUCTION

Bilateral subthalamic (STN) deep brain stimulation (DBS) has been shown to be efficacious for the amelioration of some motor symptoms of Parkinson's disease (PD). Most notably, STN DBS improves upper extremity tremor, rigidity, and bradykinesia. However, gait and balance are typically less improved and some patients report worsening of speech with the stimulators turned on. Temperli et al. (2003) studied the sequential pattern of motor changes that occurred after turning off the stimulator for up to 4 hours. We examined the UPDRS total motor score and motor subscores serially every 10 minutes for one hour after the stimulator was turned off to evaluate systematically and comprehensively the immediate residual motor benefit of STN DBS.

## OBJECTIVE

To investigate the relationship between motor scores and the duration of the residual effect of bilateral STN DBS once the stimulator is turned off.

## METHODS

### Procedure

UPDRS motor scores were assessed "on" medication

Stim Status	On	Off	Off	Off	Off	Off	Off	Off
Timing (mins)	Start	10	10	10	10	10	10	10
Cum. Timing (mins)	0	10	20	30	40	50	60	

Two patients were unable to tolerate their stimulator being turned off for 1 hour; thus the results are presented for 10 to 50 minutes.

## METHODS (cont.)

**Subjects:** 7 clinically improved bilateral male STN DBS patients.

Patient	Age (yrs)	DBS Procedure	PD Duration (yrs)	H&Y On/On
1	53	Simultaneous	11	1.5
2	52	Simultaneous	12	3
3	59	Simultaneous	14	2.5
4	69	Staged Right/Left	21	3
5	73	Simultaneous	14	3
6	60	Simultaneous	8	2.5
7	50	Simultaneous	12	2

## RESULTS

Figure 1: Total UPDRS Motor Score Change from On Stimulation

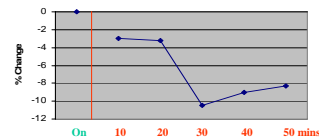
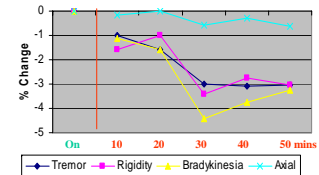
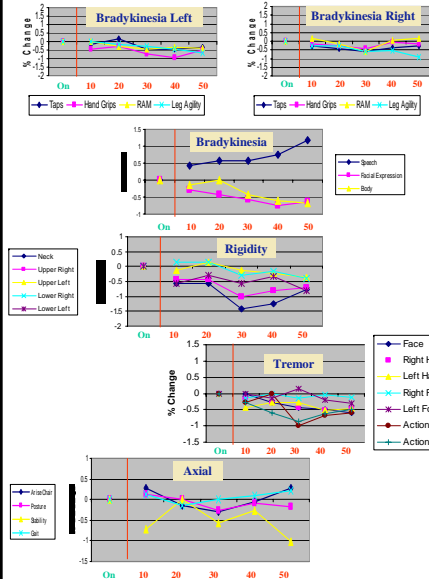


Figure 2: Motor Subscale Scores Change from On Stimulation



## RESULTS (cont.)

Figure 3: UPDRS Motor Subscale Individual Scores Change from On Stimulation



## RESULTS (cont.)

Within one hour of turning the stimulator off:

- Worsening of bradykinesia, tremor and rigidity was detected, with bradykinesia showing the most marked worsening.
- Axial symptoms did not change.
- Speech improved gradually.
- The remainder of the individual motor scores gradually declined or remained stable.

## CONCLUSIONS

Our results suggest that STN DBS has a brief residual effect on tremor and rigidity, with bradykinesia showing the greatest decline within the first 30 minutes of the stimulator being turned off. Speech showed the most dramatic improvement when the stimulator was turned off, which is consistent with patients' reports. These results are in agreement with Temperli's conclusion that STN DBS may differentially affect distinct pathophysiologic motor mechanisms.

Reference: Temperli P, Ghika J, Villemure JG, et al. (2003). How do parkinsonian signs return after discontinuation of subthalamic DBS? *Neurology*, 60: 78-81.  
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