Deep Brain Stimulation Alters Sleep Physiology and Architecture in Parkinson's Disease: A Prospective, Multi-Night, Naturalistic Polysomnography Study

Alexander J. Baumgartner, Lisa Hirt, Evan Doll, Drew S. Kern, John A. Thompson, Amy W. Amara

Supplementary Information

Supplementary Table S1. Descriptive sleep architecture and continuity outcomes by DBS and medication condition. Values are reported as median [interquartile range] for each condition.

Outcome	Pre-DBS ON Med	Pre-DBS OFF Med	Post-DBS ON Med	Post-DBS OFF Med
Total Sleep Time (min)	347 [165]	171 [130]	365 [131]	432 [102]
Sleep Onset Latency (min)	19.8 [17.8]	117 [130]	22.5 [21.3]	27.0 [20.5]
WASO (min)	125 [147]	115 [72.6]	71.5 [65.6]	95.0 [85.5]
Wake Duration (min)	148 [152]	278 [194]	109 [71.8]	129 [167]
N1 Duration (min)	27.3 [31.0]	13.0 [15.1]	25.0 [39.1]	39.5 [19.5]
N2 Duration (min)	167 [104]	66.3 [92.9]	192 [84.5]	206 [62.5]
N3 Duration (min)	49.0 [74.4]	0.75 [43.1]	64.0 [40.8]	51.5 [32.5]
REM Duration (min)	50.5 [66.6]	32.3 [41.8]	55.5 [125]	107 [129]
Total NREM Duration (min)	256 [156]	109 [116]	299 [59.4]	298 [91.5]
N1 (%)	10.7 [12.9]	10.8 [10.1]	8.07 [8.90]	8.49 [4.97]
N2 (%)	51.0 [18.5]	40.8 [35.4]	53.4 [17.4]	48.6 [19.7]
N3 (%)	13.0 [21.8]	0.45 [12.4]	17.5 [15.6]	12.0 [10.4]
REM (%)	15.3 [25.1]	21.7 [36.3]	16.3 [28.6]	24.1 [26.4]
Total NREM (%)	84.1 [23.8]	78.3 [36.3]	83.7 [28.6]	75.9 [26.4]
N2 Latency (min)	2.75 [3.38]	2.50 [10.9]	2.75 [4.00]	2.00 [3.00]
N3 Latency (min)	9.25 [28.3]	3.75 [35.3]	14.8 [29.9]	20.0 [27.5]
REM Latency (min)	133 [198]	44.3 [80.1]	95.3 [148]	56.0 [129]
Number of Awakenings (n)	28.5 [22.0]	19.0 [18.8]	26.0 [17.8]	27.0 [17.0]
Sleep Efficiency (%)	63.8 [30.9]	40.6 [37.2]	73.6 [10.6]	77.5 [22.1]

WASO = wake after sleep onset.

Supplementary Table S2. Descriptive sleep microarchitectural outcomes by DBS and medication condition. Values are reported as median [interquartile range] for each condition.

Outcome	Pre-DBS ON Med	Pre-DBS OFF Med	Post-DBS ON Med	Post-DBS OFF Med
SW Density – N2 (events/min)	3.15 [4.90]	1.08 [0.68]	4.72 [7.15]	4.34 [5.68]
SW Density – N3 (events/min)	2.45 [5.67]	0.60 [3.98]	4.15 [7.88]	2.31 [5.77]
SW Duration – N2 (sec)	0.873 [0.135]	0.879 [0.131]	0.867 [0.150]	0.858 [0.150]
SW Duration – N3 (sec)	0.868 [0.165]	0.891 [0.111]	0.857 [0.164]	0.882 [0.173]
SW Amplitude – N2 (μV)	147 [140]	169 [221]	154 [157]	151 [146]
SW Amplitude – N3 (μV)	121 [104]	124 [183]	121 [180]	110 [65.3]
SW Slope – N2 (V/msec)	363 [329]	393 [493]	386 [403]	384 [345]
SW Slope – N3 (V/msec)	294 [223]	320 [473]	297 [397]	264 [184]
SP Density – N2 (events/min)	2.14 [1.82]	2.74 [1.53]	2.44 [2.32]	2.45 [1.71]
SP Density – N3 (events/min)	2.86 [3.03]	4.26 [3.10]	2.70 [2.86]	2.87 [3.50]
SP Oscillation Frequency – N2 (Hz)	11.2 [0.651]	11.2 [0.488]	11.2 [0.732]	11.2 [0.488]
SP Oscillation Frequency – N3 (Hz)	11.2 [0.488]	11.5 [0.621]	11.2 [0.488]	11.2 [0.244]
SP Amplitude – N2 (μV)	61.8 [56.2]	60.5 [49.7]	63.6 [60.3]	55.9 [58.6]
SP Amplitude – N3 (μV)	71.2 [49.4]	56.6 [22.3]	79.8 [54.6]	72.4 [70.8]

SW = Slow wave; SP = Sleep spindle