

Long-term Clinical Experience with Directional Deep Brain Stimulation Programming: A Retrospective Review

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Supplemental Table 1. Deep brain stimulation settings

Pt.	Target	E. config. Non-direct	Amp. (mA)	Pulse width (μ S)	Freq. (Hz)	Target	E. config Direct.	Amp. (mA)	Pulse width (μ S)	Freq. (Hz)
Parkinson's disease										
Pt 1	L STN	2-C+	2.7	60	130	-	-	-	-	-
Pt 1	R STN	10-C+	2.5	90	130	-	-	-	-	-
Pt 2	L STN	2-C+	2.5	90	130	-	-	-	-	-
Pt 2	R STN	10-C+	2.0	60	130	-	-	-	-	-
Pt 3	-	-	-	-	-	R VIM	10A-C+	2.5	90	130
Pt 4*	R STN	11-C+	2.3	60	130	R STN	11B-C+	2.5	60	130
Pt 5	L STN1	2-C+	2.8	60	80	-	-	-	-	-
	L STN2	3-C+	2.8	60	80					
Pt 5	-	-	-	-	-	R STN1	10C-12+	2.5	60	80
						R STN2	11C-9+	2.6	60	80
Pt 6	L VIM	1-C+	2.3	90	130	-	-	-	-	-
Pt 7	L STN	3-C+	2.0	60	130	L STN	3B-1+	1.9	60	80
							2B-4+	1.9	60	80
Pt 7	R STN	10-C+	2.0	60	130	R STN	10C-12+	1.9	60	80
							11C-9+	1.9	60	80
Pt 8	L STN	3-C+	2.4	60	130	L STN	3A-C+	2.5	60	130
Pt 8	-	-	-	-	-	R STN	10C-C+	2.6	60	130
Pt 9	L STN	2-C+	3.0	60	130	L STN	2B-C+	2.5	60	130
Pt 9	R STN	11-C+	1.7	90	130	R STN	11C-C+	1.2	90	130
Pt 10	L STN1	2-4+	2.8	60	80	-	-	-	-	-
	L STN2	1-3+	2.8	60	80					
Pt 10	-	-	-	-	-	R STN1	10B-12+	3.0	70	80
						R STN2	11B-9+	3.0	70	80
Pt 11	-	-	-	-	-	L STN	2A-C+	2.7	60	160
Pt 11	R STN	10-C+	2.4	60	160	-	-	-	-	-
Pt 12	L STN	3-C+	2.7	90	160	L STN	3C-C+	2.9	90	160
Pt 12	R STN	10-C+	2.6	60	130	-	-	-	-	-
Pt 13	L GPi	2-C+	2.2	220	130	-	-	-	-	-
Pt 13	R GPi	10-C+	1.8	220	130	-	-	-	-	-
Pt 14	L STN	2-4+	4.0	60	130	-	-	-	-	-
Pt 14	R STN	10-C+	2.0	60	130	-	-	-	-	-
Pt 15	L STN	1-4+	2.9	90	130	-	-	-	-	-
Pt 16	L STN1	2-4+	4.3	80	80	-	-	-	-	-
	L STN2	1-3+	4.3	80	80					
Pt 16	R STN1	10-12+	3.0	60	80	-	-	-	-	-
	R STN2	9-11+	3.0	60	80					
Pt 17	L STN	2-C+	1.8	60	190	-	-	-	-	-
Pt 17	-	-	-	-	-	R STN	10C-C+	1.5	60	190
Pt 18	L STN	3-C+	2.7	60	130	-	-	-	-	-
Pt 18	R STN	10-C+	3.2	90	130	-	-	-	-	-
Pt 19	-	-	-	-	-	L VIM	2C-C+	1.3	60	130
Pt 19	R VIM	12-C+	2.5	60	130	-	-	-	-	-
Pt 20	-	-	-	-	-	L STN	10B-C+	2.0	60	130
Pt 20	R STN	10-11-C+	2.0	60	130	-	-	-	-	-
Pt 21	L STN1	1-C+	3.5	80	80	-	-	-	-	-
	L STN2	2-C+	2.5	60	80					
Pt 21	R STN1	9-C+	1.0	60	80	-	-	-	-	-
	R STN2	10-C+	1.0							

Pt 22	L STN	1-C+	1.5	90	130	-	-	-	-	-
Pt 23	-	-	-	-	-	L STN1 L STN2	2B-C+ 3-1+	2.5 2.5	60 60	80 80
Pt 23	R STN1 R STN2	10-12+ 11-9+	3.0 3.0	60 60	80 80	-	-	-	-	-
Pt 24	L STN	3-C+	3.3	60	130	-	-	-	-	-
Pt 24	R STN	10-C+	3.3	60	130	-	-	-	-	-
Pt 25*	L STN1 L STN2	3-0+ 2-4+	2.8 2.8	90 100	125 125	L STN	3B-C+	1.5	90	130
Pt 25	R STN1 R STN2	10-C+ 11-C+	3.0 3.0	100 125	125 125	-	-	-	-	-
Pt 26	L STN	2-C+	2.9	60	130	-	-	-	-	-
Pt 26	R STN	9-C+	3.1	60	130	-	-	-	-	-
Pt 27	-	-	-	-	-	L STN	3B-2B+	4.2	70	130
Pt 28	L STN	3-C+	2.2	60	130	-	-	-	-	-
Pt 28	R STN	10-C+	2.3	60	130	-	-	-	-	-
Pt 29	-	-	-	-	-	L STN	1-2C-C+	3.2	90	130
Pt 29	R STN	11-12-C+	2.8	90	130	-	-	-	-	-
Pt 30	L VIM	1-C+	2.5	60	130	-	-	-	-	-
Pt 31*	L STN1 L STN2	2-4+ 3-1+	2.2 2.2	90 60	90 90	L STN	2A-4+	3.0	90	160
Pt 31	R STN1 R STN2	10-12+ 11-9+	3.4 2.6	90 60	90 90	-	-	-	-	-
Pt 32	-	-	-	-	-	L GPi	3C-2C+	2.0	60	130
Pt 33	L STN	3-1+	2.0	60	130	-	-	-	-	-
Pt 33	R STN	11-9+	3.4	60	130	-	-	-	-	-
Pt 34	L STN1 L STN2	3-1+ 2-4+	2.0 2.0	90 90	80 80	-	-	-	-	-
Pt 34	R STN1 R STN2	10-12+ 9-11+	3.2 3.2	90 90	80 80	-	-	-	-	-
Pt 35	L GPi	2-3+	3.0	90	130	-	-	-	-	-
Pt 35	R GPi	10-11+	3.0	90	130	-	-	-	-	-
Pt 36	L VIM1 L VIM2	2-C+ 1-3+	2.5 3.2	60 60	90 90	-	-	-	-	-
Pt 36	R VIM1 R VIM2	9-11+ 10-12+	3.1 2.2	80 60	90 90	-	-	-	-	-
Pt 37	L STN	3-C+	2.5	60	130	-	-	-	-	-
Pt 37	R STN	11-C+	1.85	60	130	-	-	-	-	-
Pt 38	L STN	2-3+	3.5	60	130	-	-	-	-	-
Pt 38	R STN	11-C+	1.9	60	130	-	-	-	-	-
Pt 39	L STN1 L STN2	2-C+ 4-C+	1.15 0.85	60 60	125 125	-	-	-	-	-
Pt 39	R STN	10-12-C+	2.2	60 60	125 125	-	-	-	-	-
Pt 40	-	-	-	-	-	L VIM	2B-C+	2.7	60	130
Pt 41	L STN	2-C+	1.8	60	130					
Pt 41	R STN	10-C+	1.5	90	130	R STN	10C-C+	1.0	90	130
Pt 42	L STN	3-C+	1.8	60	130	-	-	-	-	-
Pt 42	R STN	10-C+	1.9	60	130	-	-	-	-	-
Pt 43	L STN1 L STN2	2-4+ 3-1+	2.0 2.0	80 60	90 90	-	-	-	-	-
Pt 43	R STN1 R STN2	10-12+ 11-9+	1.4 1.4	60 60	90 90	-	-	-	-	-

Pt 44	L STN1 L STN2	1-3+ 2-4+	4.0 3.0	60 60	125 125	-	-	-	-	-
Pt 44	R STN1 R STN2	10-C+ 12-C+	2.75 2.5	60 60	125 125	-	-	-	-	-
Pt 45	-	-	-	-	-	L STN1 L STN2	2A-C+ 3-1+	4.0 4.0	80 80	125 125
Pt 46	L STN1 L STN2	1-3+ 2-4+	3.3 3.3	60 60	80 80	-	-	-	-	-
Pt 46	R STN1 R STN2	10-12+ 11-9+	3.0 3.0	60 60	80 80	-	-	-	-	-
Pt 47	L STN	2-C+	2.1	60	130	-	-	-	-	-
Pt 47	R STN	11-C+	2.4	60	130	-	-	-	-	-
Pt 48	R STN	10-C+	2.6	60	130	-	-	-	-	-
Pt 49	-	-	-	-	-	L STN	10A-C+	2.6	90	130
Pt 49	R STN	11-C+	1.5	60	130	-	-	-	-	-
Pt 50	-	-	-	-	-	L STN	2B-C+	2.7	60	130
Pt 50	-	-	-	-	-	R STN	10B-11+	1.8	60	130
Pt 51	L STN	2-C+	2.1	60	130	-	-	-	-	-
Pt 51	R STN	10-12+	4.3	60	130	-	-	-	-	-
Pt 52	L STN1 L STN2	3-1+ 2-4+	4.5 4.5	60 60	125 125	-	-	-	-	-
Pt 52	R STN1 R STN2	10-12+ 11-9+	3.5 3.5	60 60	125 125	-	-	-	-	-
Pt 53	-	-	-	-	-	L STN	2A-C+	3.1	90	132
Pt 53	-	-	-	-	-	R STN	11C-C+	3.0	90	132
Pt 54	L STN	2-C+	1.5	60	130	-	-	-	-	-
Pt 54	-	-	-	-	-	R STN	11B-C+	2.8	60	130
Pt 55	L STN1 L STN2	1-3+ 2-3+	3.0 1.5	60 60	80 80	-	-	-	-	-
Pt 55	-	-	-	-	-	R STN1 R STN2	10A-12+ 11-9+	1.3 1.8	60 60	80 80
Pt 56	L STN1 L STN2	1-3+ 2-4+	3.6 3.6	60 60	80 80	-	-	-	-	-
Pt 56	R STN1 R STN2	10-12+ 11-9+	3.75 3.75	90 90	80 80	-	-	-	-	-
Essential tremor										
Pt 1*	L VIM1 L VIM2	2-4+ 3-1+	1.9 1.9	60 60	110 110	L VIM	2C-C+	1.6	60	130
Pt 1*	R VIM1 R VIM2	10-12+ 11-9+	1.9 1.9	60 60	110 110	R VIM	10A-C+	1.6	60	130
Pt 2	L VIM	1-C+	2.0	60	130	-	-	-	-	-
Pt 2	-	-	-	-	-	R VIM	10B-C+	1.5	90	130
Pt 3	L VIM	1-C+	1.6	90	130	-	-	-	-	-
Pt 4	-	-	-	-	-	L VIM	2A-C+	2.9	60	130
Pt 4	-	-	-	-	-	R VIM	11B-C+	1.9	60	130
Pt 5	L VIM1 L VIM2	1-3+ 2-3+	2.0 1.5	90 60	125 125	-	-	-	-	-
Pt 5	R VIM1 R VIM2	10-12+ 11-9+	1.5 1.5	90 60	125 125	-	-	-	-	-
Pt 6	-	-	-	-	-	R VIM	10C-C+	1.9	60	130
Pt 7	L VIM1 L VIM2	2-4+ 3-1+	2.0 2.0	90 90	125 125	-	-	-	-	-
Pt 7	-	-	-	-	-	R VIM1 R VIM2	10B-9+ 11-12+	2.0 2.0	60 60	125 125

Pt 8	L VIM	3-C+	1.6	70	130	-	-	-	-	-
Pt 8	R VIM	11-C+	1.7	60	130	R VIM	11B-C+	1.9	80	130
Pt 9	-	-	-	-	-	L VIM1	3C-1+	1.6	60	110
						L VIM2	2C-4+	1.9	60	110
Pt 9	-	-	-	-	-	R VIM1	11B-9+	1.9	60	110
						R VIM2	10B-12+	1.9	60	110
Pt 10	-	-	-	-	-	L VIM	3C-2C+	1.6	70	130
Pt 10	R VIM	11-10+	2.0	80	130	-	-	-	-	-
Pt 11	L VIM	1-C+	1.8	60	130	-	-	-	-	-
Pt 11	R VIM	9-11+	2.5	60	130	-	-	-	-	-
Pt 12	-	-	-	-	-	L VIM1	2A-3A+	4.15	90	90
						L VIM2	1-2+	3.0	90	90
Pt 12	R VIM1	10-12+	2.5	90	90	-	-	-	-	-
	R VIM2	11-9+	2.5	60	90	-	-	-	-	-
Pt 13	L VIM	3-C+	1.8	90	130	-	-	-	-	-
Pt 13	R VIM	11-C+	2.0	80	130	-	-	-	-	-
Pt 14	-	-	-	-	-	L VIM	2A-C+	2.2	90	130
Pt 14	-	-	-	-	-	R VIM	11B-C+	2.0	90	130
Pt 15	-	-	-	-	-	R VIM	10C-C+	2.5	60	130
Pt 16	-	-	-	-	-	L VIM	3B-4+	1.25	60	130
Pt 16	-	-	-	-	-	R VIM	11C-12+	1.2	60	130
Pt 17	-	-	-	-	-	L VIM	2C-C+	1.6	60	130
Pt 17	R VIM	10-C+	2.0	60	130	-	-	-	-	-
Pt 18	-	-	-	-	-	L VIM	2B-C+	1.9	60	190
Pt 18	-	-	-	-	-	R VIM	10C-C+	1.4	60	190

Supplemental Table 1. Directional and non-directional settings for each patient. These settings reflect the most recent settings for both directional and non-directional.

*Switched from directional to non-directional

Abbreviations: amp (amplitude), direct (directional), e config (electrode configuration), freq (frequency), globus pallidus internal segment (GPi), Hz (hertz), l (left), mA (milliamp), pt (patient), pw (pulse width), r (right), subthalamic nucleus (STN), ventral intermediate nucleus of the thalamus (VIM), μ S (microsecond).