

OPTIMIZED AND FULL SPECTRUM[®] DOSING PARAMETERS

NEW STANDARD OF CARE

NEW DOSING PARAMETER SETS OFFERING GREATER EFFICIENCIES AND WIDER TREATMENT RANGES

Pulse width, pulse frequency, train duration, and current (pulse amplitude) are the ECT stimulus parameters that radically determine the efficiency of stimulation.^{1,2} Now MECTA's newest, more efficient and flexible treatment options allow clinicians and ECT researchers a more extensive and optimized range of treatment parameters. Here's how:

OPTIMIZED DOSING Parameter Sets – 0.3, 0.5, 1.0 ms **NEW!** Evidence for Optimization

PULSE WIDTH likely has the greatest impact on the efficiency of stimulation. For example, the overall dosage (i.e., the charge) needed to elicit seizures is approximately 3-4 times lower when a 0.3 ms pulse width is used than when a 1.5 ms pulse width is used.³ Thus, selecting a pulse width is a key clinical determination, and MECTA SPECTRUM device users now have the option to choose from three pre-selected ranges of optimized pulse widths that begin with 0.3 ms ultrabrief stimulation, or 0.5 ms or 1.0 ms brief pulse stimulation. These pulse widths correspond to the administration of an ultrabrief stimulus (0.3 ms), a stimulus (0.5 ms) on the border between ultrabrief pulse (0.3-0.49 ms), and brief pulse (0.5-2.0 ms) stimulation which is now limited to a maximally wide brief pulse (1.0 ms). Since the inefficiency of wider pulses is firmly established,³ the upper-limit for all SPECTRUM devices is now 1.0 ms.

DURATION There is evidence that increasing the duration of the pulse train is more efficient than increasing pulse frequency.^{2,4} Overall, the evidence suggests that increases in train duration may be the next most critical parameter in terms of impact on the efficiency of seizure elicitation. Consequently, on the single dial 5000M[™]/4000M[™] models, before any other parameter is altered, increases in dose first involve an increase in train duration, until the maximum of 8 seconds is reached. On all four MECTA models and in all OPTIMIZED and FULL SPECTRUM DOSING Parameter Sets, the range of train duration is now from less than 0.5 to 8 seconds.

FREQUENCY In the 5000M[™]/4000M[™], pulse frequency is the parameter that is changed after train duration to increase dosage. It is firmly established that increases in stimulus frequency contribute to seizure induction since stimulus dose titration has often been conducted with stimulus frequency as the primary variable manipulated when incrementing dosing.^{5,6,7} The maximum frequency in the ultrabrief 0.3 ms parameter set is 120 Hz. At longer pulse widths (0.5 and 1.0 ms), maximum device output (576 mC U.S. devices) is achieved at lower pulse frequencies, resulting in a pulse frequency cutoff specific to each parameter set.



CURRENT Current or pulse amplitude is fixed at 800 mA in the OPTIMIZED 5000Q[®]/4000Q[™] parameter sets and all of the 5000M[™]/4000M[™] parameter sets. There is little published information on optimal pulse amplitude in ECT. The vast body of clinical research with MECTA devices has exclusively used the 800 mA setting, although there has been speculation that titration in the current domain* may ultimately prove superior in refining stimulus properties.²⁸ MECTA provides the only device with flexibility and choice of pulse amplitudes. Indeed, the 5000Q[®]/4000Q[™] devices have an expanded range of pulse amplitudes in the new FULL SPECTRUM DOSING Parameter Sets. This range is from 500 to 900 mA. **NEW!**

FULL SPECTRUM® DOSING Parameter Sets NEW!

The SPECTRUM 5000Q®/4000Q™ models now include a fourth parameter set that allows the experienced clinician or researcher to vary pulse width, train duration, pulse frequency and current independently throughout the full range of device parameters. Only with the SPECTRUM 5000Q®/4000Q™, FULL SPECTRUM DOSING Parameter Sets can be individualized and historical doses be selected and set, using the knob and visual interface without accessing menus. This enhances the efficiency of operation and allows the clinician and the researcher the greatest freedom in their choice of parameters.

TITRATION AND PRE-SELECTED DOSING TABLES

With these changes in optimized parameter sets, MECTA

has developed new Titration and Pre-Selected Dosing Tables. These are the most accurate and up to date tables, taking into account gender, age, and electrode placement.⁹ **NEW!** Dosing is provided at 1.5, 2.0, 2.5 and 6x seizure threshold, and is separately provided at 0.3, 0.5 and 1.0 pulse widths. Empirical titration remains the most accurate way to determine seizure threshold. MECTA provides extensive new and Historical Titration and Pre-Selected Dosing Tables for the OPTIMIZED and FULL SPECTRUM DOSING Parameter Sets. **NEW!**

Contact MECTA for pricing and upgrade information and also to order Pre-Selected and Titration Dosing Tables and/or a new MECTA Instruction Manual containing the instructions for using these new stimulus dosing parameters.

1. Sackeim HA, Long J, Lubner B, Moeller J, Prohovnik I, Devanand DP, Nobler MS. Physical properties and quantification of the ECT stimulus: I. Basic principles. *Convulsive Therapy*. 1994;10:93-123.
2. Peterchev AV, Rosa M, Deng Z, Prudic J, Lisanby S. Electroconvulsive therapy stimulus parameters: rethinking dosage. *Journal of ECT*. 2010;3:159-174.
3. Sackeim HA, Prudic J, Nobler MS, Fitzsimons L, Lisanby SH, Payne N, Berman RM, Brakemeier EL, Perera TP, Devanand DP. Effects of pulse width and electrode placement on the efficacy and cognitive effects of electroconvulsive therapy. *Brain Stimulation*. 2008;1:71-83.
4. Devanand DP, Lisanby SH, Nobler MS, Sackeim HA. The relative efficiency of altering pulse frequency or train duration when determining seizure threshold. *The Journal of ECT*. 1998;4:227-235.
5. Sackeim HA, Decina P, Prohovnik I, Malitz S. Seizure threshold in ECT: effects of sex, age, electrode placement and number of treatments. *Archives of General Psychiatry*. 1987;44:355-360.
6. Sackeim HA, Prudic J, Devanand DP, Kiersky JE, Fitzsimons L, Moody BJ, McElhiney MC, Coleman EA, Settembrino JM. Effects of stimulus intensity and electrode placement on the efficacy and cognitive effects of electroconvulsive therapy. *New England Journal of Medicine*. 1993;328:839-846.
7. Sackeim HA, Prudic J, Devanand DP, Nobler MS, Lisanby SH, Peyser S, Fitzsimons L, Moody BJ, Clark J. A prospective, randomized, double-blind comparison of bilateral and right unilateral ECT at different stimulus intensities. *Archives of General Psychiatry*. 2000;57:425-437.
8. Sackeim HA. The convulsant and anticonvulsant properties of electroconvulsive therapy: towards a focal form of brain stimulation. *Clinical Neuroscience Research*. 2004;4:39-57.
9. Sackeim HA. Electroconvulsive therapy in late life depression. In Salzman, C. (Ed.), *Clinical Geriatric Psychopharmacology*. 2004;4:385-422.

ECT PARAMETERS / 100 JOULE SYSTEMS

Q Models

	OPTIMIZED DOSING Parameter Sets			FULL SPECTRUM DOSING Parameter Set
	0.3	0.5	1.0**	Set 4** NEW!
Four Parameter Sets:				
Pulse Width	0.3-0.37 ms	0.5 ms	1.0 ms	0.3-1.0 ms
Stimulus Duration	0.5-8.0 sec	0.5-8.0 sec	0.5-8.0 sec	0.5-8.0 sec NEW!
Frequency	20-120 Hz	20-90 Hz	20-45 Hz	20-120 Hz
Stimulus Current	800 mA	800 mA	800 mA	500-900 mA NEW!
Charge	4.0-568 mC	8.0-576 mC	16-576 mC	3.0-576 mC
Energy @ 220 ohm patient impedance	0.8-100 joules	1.4-101.4 joules	2.8-101.4 joules	0.3-101.4 joules

M Models

	OPTIMIZED DOSING Parameter Sets			
	0.3	0.5	1.0**	NEW!
Three Parameter Sets:				
Pulse Width	0.3-0.38 ms	0.5 ms	1.0 ms	
Stimulus Duration	0.59-7.9 sec	0.35-8.0 sec	0.18-8.0 sec	NEW!
Frequency	20-120 Hz	20-90 Hz	20-45 Hz	
Stimulus Current	800 mA	800 mA	800 mA	NEW!
Charge	5-576 mC	5-576 mC	5-576 mC	
Energy @ 220 ohm patient impedance	1.0-101.4 joules	1.0-101.4 joules	1.0-101.4 joules	

*Patent Pending

**EEG Data Analysis enabled for use with 1.0 OPTIMIZED DOSING Parameter Sets and Historical Parameters in the FULL SPECTRUM DOSING Parameter Set.