

# Warren M Grill

## List of Publications by Year in Descending Order

**Source:** <https://exaly.com/author-pdf/115124/warren-m-grill-publications-by-year.pdf>

**Version:** 2024-04-27

This document has been generated based on the publications and citations recorded by exaly.com. For the latest version of this publication list, visit the link given above.

The third column is the impact factor (IF) of the journal, and the fourth column is the number of citations of the article.

266  
papers

10,226  
citations

53  
h-index

91  
g-index

308  
ext. papers

12,515  
ext. citations

4  
avg, IF

6.73  
L-index

#	Paper	IF	Citations
266	Characterization of bilateral, pudendal nerve-evoked, urethral rhabdosphincter contractions in anesthetized cats <b>2022</b> , 1, 100006		
265	Initial Clinical Outcome With Bilateral, Dual-Target Deep Brain Stimulation Trial in Parkinson Disease Using Summit RC + S.. <i>Neurosurgery</i> , <b>2022</b> ,	3.2	1
264	Isolating two sources of variability of subcortical stimulation to quantify fluctuations of corticospinal tract excitability.. <i>Clinical Neurophysiology</i> , <b>2022</b> , 138, 134-142	4.3	0
263	Methodologies for the Restoration of Bladder and Bowel Functions <b>2022</b> , 2014-2019		
262	Computational Models to Optimize the Electrodes and Waveforms for Deep Brain Stimulation <b>2022</b> , 938-941		
261	Stoney vs. Histed: Quantifying the spatial effects of intracortical microstimulation. <i>Brain Stimulation</i> , <b>2021</b> , 15, 141-151	5.1	2
260	Visualization of Pig Vagus Nerve "Vagotomy" Using Ultrasound.. <i>Frontiers in Neuroscience</i> , <b>2021</b> , 15, 676630	3.0	1
259	Non-monotonic kilohertz frequency neural block thresholds arise from amplitude- and frequency-dependent charge imbalance. <i>Scientific Reports</i> , <b>2021</b> , 11, 5077	4.9	2
258	Control of colonic motility using electrical stimulation to modulate enteric neural activity. <i>American Journal of Physiology - Renal Physiology</i> , <b>2021</b> , 320, G675-G687	5.1	3
257	Levodopa-Induced Dyskinesia Is Mediated by Cortical Gamma Oscillations in Experimental Parkinsonism. <i>Movement Disorders</i> , <b>2021</b> , 36, 1044-1045	7	
256	Excitation properties of computational models of unmyelinated peripheral axons. <i>Journal of Neurophysiology</i> , <b>2021</b> , 125, 86-104	3.2	3
255	Technology of deep brain stimulation: current status and future directions. <i>Nature Reviews Neurology</i> , <b>2021</b> , 17, 75-87	15	87
254	Functions of Interoception: From Energy Regulation to Experience of the Self. <i>Trends in Neurosciences</i> , <b>2021</b> , 44, 29-38	13.3	44
253	Effects of intravesical prostaglandin E on bladder function are preserved in capsaicin-desensitized rats. <i>American Journal of Physiology - Renal Physiology</i> , <b>2021</b> , 320, F212-F223	4.3	
252	Dysfunctional voiding behavior and impaired muscle contractility in a rat model of detrusor underactivity. <i>Neurourology and Urodynamics</i> , <b>2021</b> , 40, 1889-1899	2.3	0
251	Voiding behavior in awake unrestrained untethered spontaneously hypertensive and Wistar control rats. <i>American Journal of Physiology - Renal Physiology</i> , <b>2021</b> , 321, F195-F206	4.3	0
250	Adaptive Parameter Modulation of Deep Brain Stimulation Based on Improved Supervisory Algorithm. <i>Frontiers in Neuroscience</i> , <b>2021</b> , 15, 750806	5.1	1

249	ASCENT (Automated Simulations to Characterize Electrical Nerve Thresholds): A pipeline for sample-specific computational modeling of electrical stimulation of peripheral nerves. <i>PLoS Computational Biology</i> , <b>2021</b> , 17, e1009285	5	3
248	Biophysics and Mechanisms of Spinal Cord Stimulation for Chronic Pain <b>2021</b> , 1-45		0
247	State-dependent bioelectronic interface to control bladder function. <i>Scientific Reports</i> , <b>2021</b> , 11, 314	4.9	3
246	Frequency-Specific Optogenetic Deep Brain Stimulation of Subthalamic Nucleus Improves Parkinsonian Motor Behaviors. <i>Journal of Neuroscience</i> , <b>2020</b> , 40, 4323-4334	6.6	22
245	Model-Based Design of Closed Loop Deep Brain Stimulation Controller using Reinforcement Learning <b>2020</b> ,		5
244	Kilohertz waveforms optimized to produce closed-state Na <sup>+</sup> channel inactivation eliminate onset response in nerve conduction block. <i>PLoS Computational Biology</i> , <b>2020</b> , 16, e1007766	5	4
243	Sources of off-target effects of vagus nerve stimulation using the helical clinical lead in domestic pigs. <i>Journal of Neural Engineering</i> , <b>2020</b> , 17, 046017	5	16
242	Functional vagotomy in the cervical vagus nerve of the domestic pig: implications for the study of vagus nerve stimulation. <i>Journal of Neural Engineering</i> , <b>2020</b> , 17, 026022	5	20
241	In vivo quantification of excitation and kilohertz frequency block of the rat vagus nerve. <i>Journal of Neural Engineering</i> , <b>2020</b> , 17, 026005	5	14
240	Stimulation of the pelvic nerve increases bladder capacity in the PGE cat model of overactive bladder. <i>American Journal of Physiology - Renal Physiology</i> , <b>2020</b> , 318, F1357-F1368	4.3	2
239	SPARC: Parameters of Electrical Excitation and Block of the Rat Vagus Nerve. <i>FASEB Journal</i> , <b>2020</b> , 34, 1-1	0.9	
238	SPARC: Biophysical Modeling of Vagus Nerve Stimulation for Translational Scaling of Stimulation Parameters Across Species. <i>FASEB Journal</i> , <b>2020</b> , 34, 1-1	0.9	
237	SPARC: A Hybrid Computational Approach to Classify Vagal C Fiber Functions. <i>FASEB Journal</i> , <b>2020</b> , 34, 1-1	0.9	1
236	SPARC: Effect of Waveform on Kilohertz Frequency Nerve Block. <i>FASEB Journal</i> , <b>2020</b> , 34, 1-1	0.9	
235	SPARC: A Road Map for Vagus Nerve Stimulation: Evidence of Vagotomy in a Swine Model. <i>FASEB Journal</i> , <b>2020</b> , 34, 1-1	0.9	1
234	SPARC: Neural elements mediating side effects during cervical vagus nerve stimulation in the pig. <i>FASEB Journal</i> , <b>2020</b> , 34, 1-1	0.9	0
233	Spinal cord stimulation for the restoration of bladder function after spinal cord injury. <i>Healthcare Technology Letters</i> , <b>2020</b> , 7, 87-92	1.9	6
232	A comprehensive model-based framework for optimal design of biomimetic patterns of electrical stimulation for prosthetic sensation. <i>Journal of Neural Engineering</i> , <b>2020</b> , 17, 046045	5	8

231	Quantitative comparisons of block thresholds and onset responses for charge-balanced kilohertz frequency waveforms. <i>Journal of Neural Engineering</i> , <b>2020</b> , 17, 046048	5	4
230	Simulation of transcranial magnetic stimulation in head model with morphologically-realistic cortical neurons. <i>Brain Stimulation</i> , <b>2020</b> , 13, 175-189	5.1	80
229	Continuous deep brain stimulation of the subthalamic nucleus may not modulate beta bursts in patients with Parkinson's disease. <i>Brain Stimulation</i> , <b>2020</b> , 13, 433-443	5.1	17
228	Effects of ramped-frequency thalamic deep brain stimulation on tremor and activity of modeled neurons. <i>Clinical Neurophysiology</i> , <b>2020</b> , 131, 625-634	4.3	3
227	Quantified Morphology of the Cervical and Subdiaphragmatic Vagus Nerves of Human, Pig, and Rat. <i>Frontiers in Neuroscience</i> , <b>2020</b> , 14, 601479	5.1	14
226	Evoked potentials reveal neural circuits engaged by human deep brain stimulation. <i>Brain Stimulation</i> , <b>2020</b> , 13, 1706-1718	5.1	4
225	A roadmap for advancing neurostimulation approaches for bladder and bowel function after spinal cord injury. <i>Spinal Cord</i> , <b>2020</b> , 58, 1227-1232	2.7	0
224	Randomized Controlled Trial to Assess the Impact of High Concentration Intraurethral Lidocaine on Urodynamic Voiding Parameters. <i>Urology</i> , <b>2019</b> , 133, 72-77	1.6	5
223	Accuracy of robotic coil positioning during transcranial magnetic stimulation. <i>Journal of Neural Engineering</i> , <b>2019</b> , 16, 054003	5	11
222	Average firing rate rather than temporal pattern determines metabolic cost of activity in thalamocortical relay neurons. <i>Scientific Reports</i> , <b>2019</b> , 9, 6940	4.9	6
221	Multimodal characterization of the human nucleus accumbens. <i>NeuroImage</i> , <b>2019</b> , 198, 137-149	7.9	13
220	Electrodeposited platinum-iridium coating improves in vivo recording performance of chronically implanted microelectrode arrays. <i>Biomaterials</i> , <b>2019</b> , 205, 120-132	15.6	27
219	Model-Based Evaluation of Closed-Loop Deep Brain Stimulation Controller to Adapt to Dynamic Changes in Reference Signal. <i>Frontiers in Neuroscience</i> , <b>2019</b> , 13, 956	5.1	15
218	Beta Frequency Oscillations in the Subthalamic Nucleus Are Not Sufficient for the Development of Symptoms of Parkinsonian Bradykinesia/Akinesia in Rats. <i>ENeuro</i> , <b>2019</b> , 6,	3.9	10
217	Network Models of the Basal Ganglia in Parkinson's Disease: Advances in Deep Brain Stimulation Through Model-Based Optimization. <i>Springer Series in Cognitive and Neural Systems</i> , <b>2019</b> , 41-55	0.3	
216	Innovative device illuminates the horizon of bioelectronic medicines. <i>Nature Reviews Urology</i> , <b>2019</b> , 16, 209-210	5.5	1
215	Empirically Based Guidelines for Selecting Vagus Nerve Stimulation Parameters in Epilepsy and Heart Failure. <i>Cold Spring Harbor Perspectives in Medicine</i> , <b>2019</b> , 9,	5.4	15
214	Sensory pudendal nerve stimulation increases bladder capacity through sympathetic mechanisms in cyclophosphamide-induced cystitis rats. <i>Neurourology and Urodynamics</i> , <b>2019</b> , 38, 135-143	2.3	7

213	On the parameters used in finite element modeling of compound peripheral nerves. <i>Journal of Neural Engineering</i> , <b>2019</b> , 16, 016007	5	21
212	Modulation of neuroinflammation and memory dysfunction using percutaneous vagus nerve stimulation in mice. <i>Brain Stimulation</i> , <b>2019</b> , 12, 19-29	5.1	56
211	Randomized Controlled Trial to Assess the Impact of Intraurethral Lidocaine on Urodynamic Voiding Parameters. <i>Female Pelvic Medicine and Reconstructive Surgery</i> , <b>2019</b> , 25, 265-270	1.9	5
210	Effects of vagal neuromodulation on feeding behavior. <i>Brain Research</i> , <b>2018</b> , 1693, 180-187	3.7	23
209	Modified cable equation incorporating transverse polarization of neuronal membranes for accurate coupling of electric fields. <i>Journal of Neural Engineering</i> , <b>2018</b> , 15, 026003	5	19
208	Sensory percepts induced by microwire array and DBS microstimulation in human sensory thalamus. <i>Brain Stimulation</i> , <b>2018</b> , 11, 416-422	5.1	15
207	Waveforms for Neural Stimulation <b>2018</b> , 95-102		4
206	Modeling Current Sources for Neural Stimulation in COMSOL. <i>Frontiers in Computational Neuroscience</i> , <b>2018</b> , 12, 40	3.5	23
205	Detection of Bladder Contractions From the Activity of the External Urethral Sphincter in Rats Using Sparse Regression. <i>IEEE Transactions on Neural Systems and Rehabilitation Engineering</i> , <b>2018</b> , 26, 1636-1644	4.8	4
204	Biophysically realistic neuron models for simulation of cortical stimulation. <i>Journal of Neural Engineering</i> , <b>2018</b> , 15, 066023	5	45
203	Patterned low-frequency deep brain stimulation induces motor deficits and modulates cortex-basal ganglia neural activity in healthy rats. <i>Journal of Neurophysiology</i> , <b>2018</b> , 120, 2410-2422	3.2	5
202	Frequency-dependent antidromic activation in thalamocortical relay neurons: effects of synaptic inputs. <i>Journal of Neural Engineering</i> , <b>2018</b> , 15, 056001	5	8
201	Stimulation Efficiency With Decaying Exponential Waveforms in a Wirelessly Powered Switched-Capacitor Discharge Stimulation System. <i>IEEE Transactions on Biomedical Engineering</i> , <b>2018</b> , 65, 1095-1106	5	10
200	Stimulation of the sensory pudendal nerve increases bladder capacity in the rat. <i>American Journal of Physiology - Renal Physiology</i> , <b>2018</b> , 314, F543-F550	4.3	16
199	Temporal Pattern of Electrical Stimulation is a New Dimension of Therapeutic Innovation. <i>Current Opinion in Biomedical Engineering</i> , <b>2018</b> , 8, 1-6	4.4	26
198	Platform for Model-Based Design and Testing for Deep Brain Stimulation <b>2018</b> ,		5
197	Model-based deconstruction of cortical evoked potentials generated by subthalamic nucleus deep brain stimulation. <i>Journal of Neurophysiology</i> , <b>2018</b> , 120, 662-680	3.2	20
196	Translating promising strategies for bowel and bladder management in spinal cord injury. <i>Experimental Neurology</i> , <b>2018</b> , 306, 169-176	5.7	30

195	Addendum: Modified cable equation incorporating transverse polarization of neuronal membranes for accurate coupling of electric fields (J. Neural Eng. 15 026003). <i>Journal of Neural Engineering</i> , <b>2018</b> , 15, 049401	5	
194	Coupling Magnetically Induced Electric Fields to Neurons: Longitudinal and Transverse Activation. <i>Biophysical Journal</i> , <b>2018</b> , 115, 95-107	2.9	21
193	Loss of Ranbp2 in motoneurons causes disruption of nucleocytoplasmic and chemokine signaling, proteostasis of hnRNPH3 and Mmp28, and development of amyotrophic lateral sclerosis-like syndromes. <i>DMM Disease Models and Mechanisms</i> , <b>2017</b> , 10, 559-579	4.1	26
192	Stimulation of the pelvic nerve increases bladder capacity in the prostaglandin E rat model of overactive bladder. <i>American Journal of Physiology - Renal Physiology</i> , <b>2017</b> , 313, F657-F665	4.3	13
191	Modulation of activity and conduction in single dorsal column axons by kilohertz-frequency spinal cord stimulation. <i>Journal of Neurophysiology</i> , <b>2017</b> , 117, 136-147	3.2	57
190	Optimized temporal pattern of brain stimulation designed by computational evolution. <i>Science Translational Medicine</i> , <b>2017</b> , 9,	17.5	77
189	Frequency-dependent, transient effects of subthalamic nucleus deep brain stimulation on methamphetamine-induced circling and neuronal activity in the hemiparkinsonian rat. <i>Behavioural Brain Research</i> , <b>2017</b> , 320, 119-127	3.4	11
188	Evolving Applications, Technological Challenges and Future Opportunities in Neuromodulation: Proceedings of the Fifth Annual Deep Brain Stimulation Think Tank. <i>Frontiers in Neuroscience</i> , <b>2017</b> , 11, 734	5.1	42
187	Electrical stimulation of gut motility guided by an in silico model. <i>Journal of Neural Engineering</i> , <b>2017</b> , 14, 066010	5	10
186	An improved genetic algorithm for designing optimal temporal patterns of neural stimulation. <i>Journal of Neural Engineering</i> , <b>2017</b> , 14, 066013	5	21
185	Multiple Reflex Pathways Contribute to Bladder Activation by Intraurethral Stimulation in Persons With Spinal Cord Injury. <i>Urology</i> , <b>2017</b> , 109, 210-215	1.6	2
184	OAB without an overactive bladder in the acute prostaglandin E2 rat model. <i>American Journal of Physiology - Renal Physiology</i> , <b>2017</b> , 313, F1169-F1177	4.3	13
183	The effects of neuromodulation in a novel obese-prone rat model of detrusor underactivity. <i>American Journal of Physiology - Renal Physiology</i> , <b>2017</b> , 313, F815-F825	4.3	5
182	Sensory feedback from the urethra evokes state-dependent lower urinary tract reflexes in rat. <i>Journal of Physiology</i> , <b>2017</b> , 595, 5687-5698	3.9	9
181	Neuroprosthetic Control of Lower Urinary Tract Function. <i>Series on Bioengineering and Biomedical Engineering</i> , <b>2017</b> , 537-565		
180	Real-time decoding of bladder pressure from pelvic nerve activity <b>2017</b> ,		2
179	Biomarkers and Stimulation Algorithms for Adaptive Brain Stimulation. <i>Frontiers in Neuroscience</i> , <b>2017</b> , 11, 564	5.1	40
178	Short pauses in thalamic deep brain stimulation promote tremor and neuronal bursting. <i>Clinical Neurophysiology</i> , <b>2016</b> , 127, 1551-1559	4.3	21

177	Temporal pattern of stimulation modulates reflex bladder activation by pudendal nerve stimulation. <i>Neurourology and Urodynamics</i> , <b>2016</b> , 35, 882-887	2.3	9
176	Sensory and circuit mechanisms mediating lower urinary tract reflexes. <i>Autonomic Neuroscience: Basic and Clinical</i> , <b>2016</b> , 200, 21-28	2.4	17
175	Nerve excitation using an amplitude-modulated signal with kilohertz-frequency carrier and non-zero offset. <i>Journal of NeuroEngineering and Rehabilitation</i> , <b>2016</b> , 13, 63	5.3	8
174	Phasic activation of the external urethral sphincter increases voiding efficiency in the rat and the cat. <i>Experimental Neurology</i> , <b>2016</b> , 285, 173-181	5.7	18
173	Modeling the spinal pudendo-vesical reflex for bladder control by pudendal afferent stimulation. <i>Journal of Computational Neuroscience</i> , <b>2016</b> , 40, 283-96	1.4	4
172	A biophysical model of the cortex-basal ganglia-thalamus network in the 6-OHDA lesioned rat model of Parkinson's disease. <i>Journal of Computational Neuroscience</i> , <b>2016</b> , 40, 207-29	1.4	42
171	Modulation of heart rate by temporally patterned vagus nerve stimulation in the anesthetized dog. <i>Physiological Reports</i> , <b>2016</b> , 4, e12689	2.6	34
170	Enhancement of Neuromodulation with Novel Pulse Shapes Generated by Controllable Pulse Parameter Transcranial Magnetic Stimulation. <i>Brain Stimulation</i> , <b>2016</b> , 9, 39-47	5.1	28
169	Estimating postvoid residual volume without measuring residual bladder volume during serial cystometrograms. <i>American Journal of Physiology - Renal Physiology</i> , <b>2016</b> , 311, F459-68	4.3	3
168	Kilohertz Frequency Deep Brain Stimulation Is Ineffective at Regularizing the Firing of Model Thalamic Neurons. <i>Frontiers in Computational Neuroscience</i> , <b>2016</b> , 10, 22	3.5	15
167	Failure to suppress low-frequency neuronal oscillatory activity underlies the reduced effectiveness of random patterns of deep brain stimulation. <i>Journal of Neurophysiology</i> , <b>2016</b> , 115, 2791-802	3.2	23
166	Effects of Electrical Stimulation in the Inferior Colliculus on Frequency Discrimination by Rhesus Monkeys and Implications for the Auditory Midbrain Implant. <i>Journal of Neuroscience</i> , <b>2016</b> , 36, 5071-83	6.6	7
165	Corrections to A Power-Efficient Switched-Capacitor Stimulating System for Electrical/Optical Deep-Brain Stimulation[Jan 15 360-374]. <i>IEEE Journal of Solid-State Circuits</i> , <b>2015</b> , 50, 1736-1736	5.5	
164	Effects of frequency-dependent membrane capacitance on neural excitability. <i>Journal of Neural Engineering</i> , <b>2015</b> , 12, 056015-56015	5	19
163	Phantom model of transcutaneous electrical stimulation with kilohertz signals <b>2015</b> ,		2
162	Modeling the response of small myelinated and unmyelinated axons to kilohertz frequency signals <b>2015</b> ,		3
161	Design and in vivo evaluation of more efficient and selective deep brain stimulation electrodes. <i>Journal of Neural Engineering</i> , <b>2015</b> , 12, 046030	5	29
160	A neuron model of stochastic resonance using rectangular pulse trains. <i>Journal of Computational Neuroscience</i> , <b>2015</b> , 38, 53-66	1.4	8

159	Spinal sensory projection neuron responses to spinal cord stimulation are mediated by circuits beyond gate control. <i>Journal of Neurophysiology</i> , <b>2015</b> , 114, 284-300	3.2	24
158	Dynamics of the sensory response to urethral flow over multiple time scales in rat. <i>Journal of Physiology</i> , <b>2015</b> , 593, 3351-71	3.9	16
157	Model-based analysis and design of waveforms for efficient neural stimulation. <i>Progress in Brain Research</i> , <b>2015</b> , 222, 147-62	2.9	28
156	Electrical stimulation for the treatment of lower urinary tract dysfunction after spinal cord injury. <i>Journal of Spinal Cord Medicine</i> , <b>2015</b> , 38, 135-46	1.9	48
155	Measurement of evoked potentials during thalamic deep brain stimulation. <i>Brain Stimulation</i> , <b>2015</b> , 8, 42-56	5.1	27
154	Bioelectronic medicines: a research roadmap. <i>Nature Reviews Drug Discovery</i> , <b>2014</b> , 13, 399-400	64.1	201
153	Influences of interpolation error, electrode geometry, and the electrode-tissue interface on models of electric fields produced by deep brain stimulation. <i>IEEE Transactions on Biomedical Engineering</i> , <b>2014</b> , 61, 297-307	5	29
152	Modeling effects of spinal cord stimulation on wide-dynamic range dorsal horn neurons: influence of stimulation frequency and GABAergic inhibition. <i>Journal of Neurophysiology</i> , <b>2014</b> , 112, 552-67	3.2	38
151	Analysis of deep brain stimulation electrode characteristics for neural recording. <i>Journal of Neural Engineering</i> , <b>2014</b> , 11, 046010	5	25
150	Simultaneous transcranial magnetic stimulation and single-neuron recording in alert non-human primates. <i>Nature Neuroscience</i> , <b>2014</b> , 17, 1130-6	25.5	88
149	Evaluation of high-perimeter electrode designs for deep brain stimulation. <i>Journal of Neural Engineering</i> , <b>2014</b> , 11, 046026	5	25
148	A spinal GABAergic mechanism is necessary for bladder inhibition by pudendal afferent stimulation. <i>American Journal of Physiology - Renal Physiology</i> , <b>2014</b> , 307, F921-30	4.3	24
147	Volume conductor model of transcutaneous electrical stimulation with kilohertz signals. <i>Journal of Neural Engineering</i> , <b>2014</b> , 11, 066012	5	12
146	Selective co-stimulation of pudendal afferents enhances bladder activation and improves voiding efficiency. <i>Neurourology and Urodynamics</i> , <b>2014</b> , 33, 1272-8	2.3	26
145	Deep brain stimulation of the subthalamic nucleus reestablishes neuronal information transmission in the 6-OHDA rat model of parkinsonism. <i>Journal of Neurophysiology</i> , <b>2014</b> , 111, 1949-59	3.2	42
144	Investigation of deep brain stimulation mechanisms during implantable pulse generator replacement surgery. <i>Neuromodulation</i> , <b>2014</b> , 17, 419-24; discussion 424	3.1	13
143	Response of human thalamic neurons to high-frequency stimulation. <i>PLoS ONE</i> , <b>2014</b> , 9, e96026	3.7	13
142	Mechanisms and models of spinal cord stimulation for the treatment of neuropathic pain. <i>Brain Research</i> , <b>2014</b> , 1569, 19-31	3.7	96

141	Evaluation of intradural stimulation efficiency and selectivity in a computational model of spinal cord stimulation. <i>PLoS ONE</i> , <b>2014</b> , 9, e114938	3.7	33
140	Model-based analysis and design of nerve cuff electrodes for restoring bladder function by selective stimulation of the pudendal nerve. <i>Journal of Neural Engineering</i> , <b>2013</b> , 10, 036010	5	34
139	Experimental and model-based analysis of differences in perception of cutaneous electrical stimulation across the sole of the foot. <i>Medical and Biological Engineering and Computing</i> , <b>2013</b> , 51, 999-1009	3.1	11
138	Activation of peripheral nerve fibers by electrical stimulation in the sole of the foot. <i>BMC Neuroscience</i> , <b>2013</b> , 14, 116	3.2	21
137	Principles of electrical stimulation of neural tissue. <i>Handbook of Clinical Neurology / Edited By P J Vinken and G W Bruyn</i> , <b>2013</b> , 116, 3-18	3	66
136	Temporal patterns of pudendal afferent stimulation modulate reflex bladder activation <b>2013</b> ,		1
135	<b>2013</b> ,		2
134	High-resolution measurement of electrically-evoked vagus nerve activity in the anesthetized dog. <i>Journal of Neural Engineering</i> , <b>2013</b> , 10, 026003	5	79
133	Improved efficacy of temporally non-regular deep brain stimulation in Parkinson's disease. <i>Experimental Neurology</i> , <b>2013</b> , 239, 60-7	5.7	86
132	<b>2013</b> ,		1
131	Model-based analysis of multiple electrode array stimulation for epiretinal visual prostheses. <i>Journal of Neural Engineering</i> , <b>2013</b> , 10, 036002	5	21
130	Neural origin of evoked potentials during thalamic deep brain stimulation. <i>Journal of Neurophysiology</i> , <b>2013</b> , 110, 826-43	3.2	17
129	Bilateral pudendal afferent stimulation improves bladder emptying in rats with urinary retention. <i>BJU International</i> , <b>2012</b> , 109, 1051-8	5.6	18
128	Effects of stimulation site and stimulation parameters on bladder inhibition by electrical nerve stimulation. <i>BJU International</i> , <b>2012</b> , 110, 136-43	5.6	43
127	Urethral flow-responsive afferents in the cat sacral dorsal root ganglia. <i>Neuroscience Letters</i> , <b>2012</b> , 516, 34-8	3.3	21
126	Computer-based model of epidural motor cortex stimulation: effects of electrode position and geometry on activation of cortical neurons. <i>Clinical Neurophysiology</i> , <b>2012</b> , 123, 160-72	4.3	52
125	Tremor reduction and modeled neural activity during cycling thalamic deep brain stimulation. <i>Clinical Neurophysiology</i> , <b>2012</b> , 123, 1044-52	4.3	24
124	Characterizing effects of subthalamic nucleus deep brain stimulation on methamphetamine-induced circling behavior in hemi-Parkinsonian rats. <i>IEEE Transactions on Neural Systems and Rehabilitation Engineering</i> , <b>2012</b> , 20, 626-35	4.8	22

123	Electrochemical Charge Storage Properties of Vertically Aligned Carbon Nanotube Films: Effects of Thermal Oxidation. <i>Journal of Physical Chemistry C</i> , <b>2012</b> , 116, 19526-19534	3.8	4
122	Relative contributions of local cell and passing fiber activation and silencing to changes in thalamic fidelity during deep brain stimulation and lesioning: a computational modeling study. <i>Journal of Computational Neuroscience</i> , <b>2012</b> , 32, 499-519	1.4	68
121	Effective deep brain stimulation suppresses low-frequency network oscillations in the basal ganglia by regularizing neural firing patterns. <i>Journal of Neuroscience</i> , <b>2012</b> , 32, 15657-68	6.6	117
120	Stimulus features underlying reduced tremor suppression with temporally patterned deep brain stimulation. <i>Journal of Neurophysiology</i> , <b>2012</b> , 107, 364-83	3.2	80
119	Peripheral nerve stimulation in regional anesthesia. <i>Regional Anesthesia and Pain Medicine</i> , <b>2012</b> , 37, 383-92	3.4	31
118	Multiple pudendal sensory pathways reflexly modulate bladder and urethral activity in patients with spinal cord injury. <i>Journal of Urology</i> , <b>2011</b> , 185, 737-43	2.5	35
117	Excitation properties of the right cervical vagus nerve in adult dogs. <i>Experimental Neurology</i> , <b>2011</b> , 227, 62-8	5.7	66
116	Closed-loop control of deep brain stimulation: a simulation study. <i>IEEE Transactions on Neural Systems and Rehabilitation Engineering</i> , <b>2011</b> , 19, 15-24	4.8	148
115	Effects of stimulation parameters and electrode location on thresholds for epidural stimulation of cat motor cortex. <i>Journal of Neural Engineering</i> , <b>2011</b> , 8, 066016	5	7
114	Instrumentation to record evoked potentials for closed-loop control of deep brain stimulation. <i>Annual International Conference of the IEEE Engineering in Medicine and Biology Society IEEE Engineering in Medicine and Biology Society Annual International Conference</i> , <b>2011</b> , 2011, 6777-80	0.9	13
113	Electrical stimulation of the urethra evokes bladder contractions and emptying in spinal cord injury men: case studies. <i>Journal of Spinal Cord Medicine</i> , <b>2011</b> , 34, 315-21	1.9	20
112	Mechanisms of reflex bladder activation by pudendal afferents. <i>American Journal of Physiology - Regulatory Integrative and Comparative Physiology</i> , <b>2011</b> , 300, R398-407	3.2	27
111	Electrochemical Charge Storage Properties of Vertically Aligned Carbon Nanotube Films: The Activation-Enhanced Length Effect. <i>Journal of the Electrochemical Society</i> , <b>2011</b> , 158, K217	3.9	2
110	Selective co-stimulation of pudendal afferents enhances reflex bladder activation. <i>Annual International Conference of the IEEE Engineering in Medicine and Biology Society IEEE Engineering in Medicine and Biology Society Annual International Conference</i> , <b>2011</b> , 2011, 1057-60	0.9	2
109	Modeling deep brain stimulation: point source approximation versus realistic representation of the electrode. <i>Journal of Neural Engineering</i> , <b>2010</b> , 7, 066009	5	23
108	Energy-efficient waveform shapes for neural stimulation revealed with a genetic algorithm. <i>Journal of Neural Engineering</i> , <b>2010</b> , 7, 046009	5	105
107	Electrical stimulation of the urethra evokes bladder contractions in a woman with spinal cord injury. <i>Journal of Spinal Cord Medicine</i> , <b>2010</b> , 33, 261-5	1.9	14
106	Functional electrical stimulation helps replenish progenitor cells in the injured spinal cord of adult rats. <i>Experimental Neurology</i> , <b>2010</b> , 222, 211-8	5.7	44

105	Conditional and continuous electrical stimulation increase cystometric capacity in persons with spinal cord injury. <i>Neurourology and Urodynamics</i> , <b>2010</b> , 29, 401-7	2.3	40
104	Deep brain stimulation alleviates parkinsonian bradykinesia by regularizing pallidal activity. <i>Journal of Neurophysiology</i> , <b>2010</b> , 104, 911-21	3.2	119
103	Efficiency analysis of waveform shape for electrical excitation of nerve fibers. <i>IEEE Transactions on Neural Systems and Rehabilitation Engineering</i> , <b>2010</b> , 18, 319-28	4.8	73
102	Finite element modeling and in vivo analysis of electrode configurations for selective stimulation of pudendal afferent fibers. <i>BMC Urology</i> , <b>2010</b> , 10, 11	2.2	11
101	Principles of Electric Field Generation for Stimulation of the Central Nervous System <b>2009</b> , 145-155		3
100	Analysis of high-perimeter planar electrodes for efficient neural stimulation. <i>Frontiers in Neuroengineering</i> , <b>2009</b> , 2, 15		38
99	Intraurethral activation of excitatory bladder reflexes in persons with spinal cord injury. <i>Annual International Conference of the IEEE Engineering in Medicine and Biology Society IEEE Engineering in Medicine and Biology Society Annual International Conference</i> , <b>2009</b> , 2009, 6781-4	0.9	5
98	High efficiency electrodes for deep brain stimulation. <i>Annual International Conference of the IEEE Engineering in Medicine and Biology Society IEEE Engineering in Medicine and Biology Society Annual International Conference</i> , <b>2009</b> , 2009, 3298-301	0.9	16
97	Electrical stimulation for control of bladder function. <i>Annual International Conference of the IEEE Engineering in Medicine and Biology Society IEEE Engineering in Medicine and Biology Society Annual International Conference</i> , <b>2009</b> , 2009, 2369-70	0.9	6
96	Genetic algorithm reveals energy-efficient waveforms for neural stimulation. <i>Annual International Conference of the IEEE Engineering in Medicine and Biology Society IEEE Engineering in Medicine and Biology Society Annual International Conference</i> , <b>2009</b> , 2009, 634-7	0.9	6
95	Measurement of the current-distance relationship using a novel refractory interaction technique. <i>Journal of Neural Engineering</i> , <b>2009</b> , 6, 036005	5	5
94	Impedance characteristics of deep brain stimulation electrodes in vitro and in vivo. <i>Journal of Neural Engineering</i> , <b>2009</b> , 6, 046008	5	100
93	Hindlimb endpoint forces predict movement direction evoked by intraspinal microstimulation in cats. <i>IEEE Transactions on Neural Systems and Rehabilitation Engineering</i> , <b>2009</b> , 17, 379-89	4.8	18
92	Implanted neural interfaces: biochallenges and engineered solutions. <i>Annual Review of Biomedical Engineering</i> , <b>2009</b> , 11, 1-24	12	374
91	Myoclonus and tremor response to thalamic deep brain stimulation parameters in a patient with inherited myoclonus-dystonia syndrome. <i>Clinical Neurology and Neurosurgery</i> , <b>2009</b> , 111, 303-6	2	54
90	Intraurethral stimulation evokes bladder responses via 2 distinct reflex pathways. <i>Journal of Urology</i> , <b>2009</b> , 182, 366-73	2.5	29
89	Computer-based finite element modeling of insulated Tuohy needles used in regional anesthesia. <i>Anesthesiology</i> , <b>2009</b> , 110, 1229-34	4.3	2
88	Somatic innervation of the feline lower urinary tract. <i>Brain Research</i> , <b>2008</b> , 1246, 80-7	3.7	19

87	A method to estimate the spatial extent of activation in thalamic deep brain stimulation. <i>Clinical Neurophysiology</i> , <b>2008</b> , 119, 2148-58	4.3	58
86	Improved bladder emptying in urinary retention by electrical stimulation of pudendal afferents. <i>Journal of Neural Engineering</i> , <b>2008</b> , 5, 144-54	5	38
85	Bladder activation by selective stimulation of pudendal nerve afferents in the cat. <i>Experimental Neurology</i> , <b>2008</b> , 212, 218-25	5.7	71
84	Analysis of the quasi-static approximation for calculating potentials generated by neural stimulation. <i>Journal of Neural Engineering</i> , <b>2008</b> , 5, 44-53	5	131
83	Computational modeling of epidural cortical stimulation. <i>Journal of Neural Engineering</i> , <b>2008</b> , 5, 443-54	5	52
82	Activation and inhibition of the micturition reflex by penile afferents in the cat. <i>American Journal of Physiology - Regulatory Integrative and Comparative Physiology</i> , <b>2008</b> , 294, R1880-9	3.2	53
81	Role of pudendal afferents in voiding efficiency in the rat. <i>American Journal of Physiology - Regulatory Integrative and Comparative Physiology</i> , <b>2008</b> , 294, R660-72	3.2	64
80	Deep brain stimulation reduces neuronal entropy in the MPTP-primate model of Parkinson's disease. <i>Journal of Neurophysiology</i> , <b>2008</b> , 100, 2807-18	3.2	122
79	A model predicting optimal parameters for deep brain stimulation in essential tremor. <i>Journal of Clinical Neurophysiology</i> , <b>2008</b> , 25, 265-73	2.2	16
78	Tremor varies as a function of the temporal regularity of deep brain stimulation. <i>NeuroReport</i> , <b>2008</b> , 19, 599-602	1.7	52
77	Mechanisms of deep brain stimulation in movement disorders as revealed by changes in stimulus frequency. <i>Neurotherapeutics</i> , <b>2008</b> , 5, 14-25	6.4	101
76	Antidromic propagation of action potentials in branched axons: implications for the mechanisms of action of deep brain stimulation. <i>Journal of Computational Neuroscience</i> , <b>2008</b> , 24, 81-93	1.4	48
75	Mechanisms underlying reversal of motor unit activation order in electrically evoked contractions after spinal cord injury. <i>Muscle and Nerve</i> , <b>2008</b> , 37, 210-8	3.4	8
74	Dorsal genital nerve stimulation for the treatment of overactive bladder symptoms. <i>Neurourology and Urodynamics</i> , <b>2008</b> , 27, 499-503	2.3	70
73	Computational evaluation of methods for measuring the spatial extent of neural activation. <i>Journal of Neuroscience Methods</i> , <b>2008</b> , 173, 153-64	3	6
72	Fabrication and evaluation of conductive elastomer electrodes for neural stimulation. <i>Journal of Biomaterials Science, Polymer Edition</i> , <b>2007</b> , 18, 1057-73	3.5	28
71	Minimally-invasive electrical stimulation of the pudendal nerve: a pre-clinical study for neural control of the lower urinary tract. <i>Neurourology and Urodynamics</i> , <b>2007</b> , 26, 562-569	2.3	25
70	Pudendal nerve stimulation evokes reflex bladder contractions in persons with chronic spinal cord injury. <i>Neurourology and Urodynamics</i> , <b>2007</b> , 26, 1020-3	2.3	50

69	Lead design and initial applications of a new lead for long-term endovascular vagal stimulation. <i>PACE - Pacing and Clinical Electrophysiology</i> , <b>2007</b> , 30 Suppl 1, S215-8	1.6	4
68	Guest Editorial Special Theme on Deep Brain Stimulation. <i>IEEE Transactions on Neural Systems and Rehabilitation Engineering</i> , <b>2007</b> , 15, 153-154	4.8	
67	Amplitude- and frequency-dependent changes in neuronal regularity parallel changes in tremor With thalamic deep brain stimulation. <i>IEEE Transactions on Neural Systems and Rehabilitation Engineering</i> , <b>2007</b> , 15, 190-7	4.8	61
66	Role of biomechanics and muscle activation strategy in the production of endpoint force patterns in the cat hindlimb. <i>Journal of Biomechanics</i> , <b>2007</b> , 40, 3679-87	2.9	4
65	Basal Ganglia Modeling in Healthy and Parkinson's Disease State. I. Isolated Neurons Activity. <i>Proceedings of the American Control Conference</i> , <b>2007</b> ,	1.2	9
64	Pulse-to-pulse changes in the frequency of deep brain stimulation affect tremor and modeled neuronal activity. <i>Journal of Neurophysiology</i> , <b>2007</b> , 98, 1675-84	3.2	43
63	Basal Ganglia Modeling in Healthy and Parkinson's Disease State. II. Network-based Multi-Units Simulation. <i>Proceedings of the American Control Conference</i> , <b>2007</b> ,	1.2	5
62	Signal Considerations for Chronically Implanted Electrodes for Brain Interfacing. <i>Frontiers in Neuroengineering Series</i> , <b>2007</b> , 41-61		5
61	Sites of neuronal excitation by epiretinal electrical stimulation. <i>IEEE Transactions on Neural Systems and Rehabilitation Engineering</i> , <b>2006</b> , 14, 5-13	4.8	55
60	Detection of neurogenic detrusor contractions from the activity of the external anal sphincter in cat and human. <i>Neurourology and Urodynamics</i> , <b>2006</b> , 25, 140-7	2.3	27
59	Clinical response to varying the stimulus parameters in deep brain stimulation for essential tremor. <i>Movement Disorders</i> , <b>2006</b> , 21, 1920-8	7	92
58	Closed loop electrical control of urinary continence. <i>Journal of Urology</i> , <b>2006</b> , 175, 1559-63	2.5	43
57	Bladder emptying by intermittent electrical stimulation of the pudendal nerve. <i>Journal of Neural Engineering</i> , <b>2006</b> , 3, 43-51	5	43
56	Nerve Stimulation <b>2006</b> ,		3
55	Neuromuscular Stimulation <b>2006</b> , 1-7		
54	Frequency-dependent selection of reflexes by pudendal afferents in the cat. <i>Journal of Physiology</i> , <b>2006</b> , 577, 115-26	3.9	78
53	Electrical Stimulation of the Neuromuscular System <b>2005</b> , 157-191		9
52	Temporal excitation properties of paresthesias evoked by thalamic microstimulation. <i>Clinical Neurophysiology</i> , <b>2005</b> , 116, 1227-34	4.3	21

51	Current density distributions, field distributions and impedance analysis of segmented deep brain stimulation electrodes. <i>Journal of Neural Engineering</i> , <b>2005</b> , 2, 139-47	5	115
50	Spinal micturition reflex mediated by afferents in the deep perineal nerve. <i>Journal of Neurophysiology</i> , <b>2005</b> , 93, 2688-97	3.2	53
49	Structural mechanisms to produce differential dendritic gains. <i>Brain Research</i> , <b>2005</b> , 1033, 117-27	3.7	5
48	Detecting the onset of hyper-reflexive bladder contractions from the electrical activity of the pudendal nerve. <i>IEEE Transactions on Neural Systems and Rehabilitation Engineering</i> , <b>2005</b> , 13, 428-35	4.8	43
47	Functional magnetic resonance imaging of the human lumbar spinal cord. <i>Journal of Magnetic Resonance Imaging</i> , <b>2005</b> , 21, 527-35	5.6	25
46	Fascicular anatomy and surgical access of the human pudendal nerve. <i>World Journal of Urology</i> , <b>2005</b> , 23, 411-8	4	32
45	Applied electric fields accelerate the diffusion rate and increase the diffusion distance of Dil in fixed tissue. <i>Journal of Neuroscience Methods</i> , <b>2005</b> , 141, 155-63	3	15
44	Polarization of a spherical cell in a nonuniform extracellular electric field. <i>Annals of Biomedical Engineering</i> , <b>2005</b> , 33, 603-15	4.7	25
43	Safety considerations for deep brain stimulation: review and analysis. <i>Expert Review of Medical Devices</i> , <b>2005</b> , 2, 409-20	3.5	58
42	Modularity of motor output evoked by intraspinal microstimulation in cats. <i>Journal of Neurophysiology</i> , <b>2004</b> , 91, 502-14	3.2	99
41	Cellular effects of deep brain stimulation: model-based analysis of activation and inhibition. <i>Journal of Neurophysiology</i> , <b>2004</b> , 91, 1457-69	3.2	592
40	Prediction of myelinated nerve fiber stimulation thresholds: limitations of linear models. <i>IEEE Transactions on Biomedical Engineering</i> , <b>2004</b> , 51, 229-36	5	47
39	Electrical localization of neural activity in the dorsal horn of the spinal cord: a modeling study. <i>Annals of Biomedical Engineering</i> , <b>2004</b> , 32, 1694-709	4.7	2
38	Sensitivity of temporal excitation properties to the neuronal element activated by extracellular stimulation. <i>Journal of Neuroscience Methods</i> , <b>2004</b> , 132, 91-9	3	24
37	A urethral afferent mediated excitatory bladder reflex exists in humans. <i>Neuroscience Letters</i> , <b>2004</b> , 360, 9-12	3.3	66
36	Selection of stimulus parameters for deep brain stimulation. <i>Clinical Neurophysiology</i> , <b>2004</b> , 115, 2431-41	4.3	315
35	Deep brain stimulation creates an informational lesion of the stimulated nucleus. <i>NeuroReport</i> , <b>2004</b> , 15, 1137-40	1.7	247
34	ELECTRICAL STIMULATION OF THE PERIPHERAL NERVOUS SYSTEM: BIOPHYSICS AND EXCITATION PROPERTIES. <i>Series on Bioengineering and Biomedical Engineering</i> , <b>2004</b> , 319-341		2

33	A catheter based method to activate urethral sensory nerve fibers. <i>Journal of Urology</i> , <b>2003</b> , 170, 126-9	2.5	29
32	Extracellular stimulation of central neurons: influence of stimulus waveform and frequency on neuronal output. <i>Journal of Neurophysiology</i> , <b>2002</b> , 88, 1592-604	3.2	285
31	Effects of stochastic sodium channels on extracellular excitation of myelinated nerve fibers. <i>IEEE Transactions on Biomedical Engineering</i> , <b>2002</b> , 49, 527-32	5	13
30	Electrical stimulation for the treatment of bladder dysfunction: current status and future possibilities. <i>Neurological Research</i> , <b>2002</b> , 24, 413-30	2.7	79
29	Modeling the excitability of mammalian nerve fibers: influence of afterpotentials on the recovery cycle. <i>Journal of Neurophysiology</i> , <b>2002</b> , 87, 995-1006	3.2	461
28	Evaluation of command algorithms for control of upper-extremity neural prostheses. <i>IEEE Transactions on Neural Systems and Rehabilitation Engineering</i> , <b>2002</b> , 10, 94-101	4.8	12
27	Optimal filtering of whole nerve signals. <i>Journal of Neuroscience Methods</i> , <b>2001</b> , 106, 101-10	3	15
26	Detection and inhibition of hyperreflexia-like bladder contractions in the cat by sacral nerve root recording and electrical stimulation. <i>Neurourology and Urodynamics</i> , <b>2001</b> , 20, 215-30	2.3	58
25	Finite element analysis of the current-density and electric field generated by metal microelectrodes. <i>Annals of Biomedical Engineering</i> , <b>2001</b> , 29, 227-35	4.7	121
24	Extracellular excitation of central neurons: implications for the mechanisms of deep brain stimulation. <i>Thalamus &amp; Related Systems</i> , <b>2001</b> , 1, 269-277		11
23	Extracellular excitation of central neurons: implications for the mechanisms of deep brain stimulation. <i>Thalamus &amp; Related Systems</i> , <b>2001</b> , 1, 269		57
22	Detection and inhibition of hyperreflexia-like bladder contractions in the cat by sacral nerve root recording and electrical stimulation <b>2001</b> , 20, 215		2
21	Neural and connective tissue response to long-term implantation of multiple contact nerve cuff electrodes. <i>Journal of Biomedical Materials Research Part B</i> , <b>2000</b> , 50, 215-26		77
20	Electrical activation of spinal neural circuits: application to motor-system neural prostheses. <i>Neuromodulation</i> , <b>2000</b> , 3, 97-106	3.1	12
19	Selective microstimulation of central nervous system neurons. <i>Annals of Biomedical Engineering</i> , <b>2000</b> , 28, 219-33	4.7	171
18	Neuroprosthetic applications of electrical stimulation. <i>Assistive Technology</i> , <b>2000</b> , 12, 6-20	1.5	56
17	Intraspinal Microstimulation. <i>Frontiers in Neuroscience</i> , <b>2000</b> ,		5
16	Neural and connective tissue response to long-term implantation of multiple contact nerve cuff electrodes <b>2000</b> , 50, 215		19

15	Bladder and urethral pressures evoked by microstimulation of the sacral spinal cord in cats. <i>Brain Research</i> , <b>1999</b> , 836, 19-30	3.7	67
14	FUNCTIONAL ANATOMY OF THE MALE FELINE URETHRA: MORPHOLOGICAL AND PHYSIOLOGICAL CORRELATIONS. <i>Journal of Urology</i> , <b>1999</b> , 161, 654-659	2.5	32
13	Extended survival time following pseudorabies virus injection labels the suprapontine neural network controlling the bladder and urethra in the rat. <i>Neuroscience Letters</i> , <b>1999</b> , 270, 63-6	3.3	14
12	Tapping into spinal circuits to restore motor function. <i>Brain Research Reviews</i> , <b>1999</b> , 30, 27-51		157
11	Excitation of central nervous system neurons by nonuniform electric fields. <i>Biophysical Journal</i> , <b>1999</b> , 76, 878-88	2.9	253
10	Neural Prosthesis <b>1999</b> ,		4
9	Identification of the spinal neural network involved in coordination of micturition in the male cat. <i>Brain Research</i> , <b>1998</b> , 796, 150-60	3.7	24
8	Sensitivity analysis of a model of mammalian neural membrane. <i>Biological Cybernetics</i> , <b>1998</b> , 79, 29-37	2.8	36
7	Non-invasive measurement of the input-output properties of peripheral nerve stimulating electrodes. <i>Journal of Neuroscience Methods</i> , <b>1996</b> , 65, 43-50	3	32
6	Electrical properties of implant encapsulation tissue. <i>Annals of Biomedical Engineering</i> , <b>1994</b> , 22, 23-33	4.7	254
5	Electrical impedance of electrode encapsulation tissue <b>1992</b> ,		1
4	Biophysically Realistic Neuron Models for Simulation of Cortical Stimulation		2
3	In vivo visualization of pig vagus nerve Vagotomy Using ultrasound		2
2	Simulation of transcranial magnetic stimulation in head model with morphologically-realistic cortical neurons		2
1	Functional Vagotomy in the Cervical Vagus Nerve of the Domestic Pig: Implications for the Study of Vagus Nerve Stimulation		3