Date Prepared: August 15, 2022 Name: Jose L. Herrero Rubio Office Address: 4th floor, 350 Community Dr, Manhasset, NY 11030 Home Address: 127W 136th ST, apt 2, New York, NY 10030 Work Phone: 917-618-98-11 Work Email: jherreroru@northwell.edu Work FAX: 917-618-98-11

(Human electrophysiology)

Educational Background

Education

2002 BS	Psychology Sciences	Salamanca University (Spain)
2007 MSc	Research Methods & Cognitive Sciences	Sunderland University (UK)
2011 PhD	Neuroscience & Pharmacology	Newcastle University (UK)
Postdoctora	ll Training	
2012-2015	Research Fellow in Neuroscience (Monkey electrophysiology)	Columbia University, USA
2015-2017	Research Fellow in Neuroscience	Feinstein Institutes for Medical

Research, USA

Professional Experience

Faculty Academic A	ppointments		
2019-Present	Assistant Professor	Feinstein Institutes for Medical Research, USA	
Appointments at Ho	spitals/Affiliated Institutions		
2017-2019	Research Scientist	North Shore University Hospital, Neurosurgery, USA	
2013-2016	Research Scientist	Nathan Kline Institute for Psychiatric Research, USA	
Other Professional H	Positions		
2022-Present	Visiting Scientist	Columbia University, USA	
2019-Present	Consultant	Physiology First University, USA	

Professional Societies

2012 - Present	Member
2012 - 2016	Member
2017 - 2020	Member
2018 - 2021	Member
2017 - 2019	Member

Editorial Activities Journal Reviewer

Journal Reviewer		
2015 - Present	Ad hoc reviewer	Journal of Neuroscience
2017 - Present	Ad hoc reviewer	Frontiers in Neurology
2019 - Present	Ad hoc reviewer	Psychophysiology
2013 - Present	Ad hoc reviewer	Cognitive and Behavioral Neurology
2015 - Present	Ad hoc reviewer	PLoS

Society for Neuroscience

Mind and Life Institute American Epilepsy Society

New York Academy of Science

American Neuromodulation Society

Honors and Prizes

2011	The Queen's Anniversary Medical Science Doctoral Prize (PhD Thesis)	Newcastle University, UK.
2007 - 2011	Young Investigator PhD Award.	Biotechnology and Biological Science Research Council Newcastle University, UK.
2007	Young Investigator Award	Erasmus program (Sunderland, UK)
2003	Young Investigator Award	Erasmus program (Lisbon, Portugal)

Report of Funded and Unfunded Projects

Funding Infor	mation
Past	
2012 - 2015	Neural circuits and pharmaco-physiology fundamental to neocortical dynamics in the macaque monkey Human Frontiers Science Program Grant # 234567 PI (\$150,000) The major goal of this project is to study the layer-specific cortical dynamics during attentional processes
2017 - 2020	Intracranial circuits underlying Deep Slow Breathing and its palliative effects Mind & Life Institute Grant # 540767 PI (\$20,000) The major goal of this project is to study the cortical dynamics during deep slow breathing and pain perception.

Current

2022 - 2027	Characterizing the sensory and affective neural
	components of persistent dyspnea
	NIH Grant # R01HL163578
	PI (\$2,064,821)
	The major goal of this project is to study the brain
	mechanisms underlying persistent breathlessness using
	intracranial electrodes under a model of dyspnea
2022 - 2027	Neurobiology and Cognitive Functions of Slow brain
	Network Fluctuations
	NIMH - P50 - PAR-20-093
	Co-I (\$1,773,524)
	The major goal of this project is to study the neural basis
	of external versus internal attention and its implications
	for understanding neuropsychiatric disorders

Current Unfunded Projects

2020 - Present Study of the neural control of breathing and its applications to anxiety I am investigating the changes in neural excitability resulting from different breathwork and biofeedback techniques.

Report of Local Teaching and Training

Teaching of Students in Courses				
2021	Breathwork for PTSD	Joint Base McGuire–Dix–Lakehurst		
		(NJ)		
2021	Neurophysiology of respiroception	Physiology First University (Main)		

Formal Teaching of Residents, Clinical Fellows and Research Fellows (post-docs)

2005-2010	Lecturer: modules of Biological	University of Sunderland (UK)
	Psychology and Research	•
	Methods	

Clinical Supervisory and Training Responsibilities

2015 - Present	EEG technologist	Supervision of EEG technologists and	
	North Shore University Hospital	researchers on aspects related to	
	Lenox Hill Hospital	electrophysiology.	

Laboratory and Other Research Supervisory and Training Responsibilities

2015 - Present Guidance of research assistants, doctoral and post-doctoral research fellows, and technologists at the FIMR. Daily mentorship.

Formally Supervised Trainees

 2019-2020 Alexander Smith, MD/currently doing his residency in Psychiatry at Hofstra Northwell School of Medicine
I mentored Dr. Smith during his research internship in our lab (HBML). He has been second author on an article in the Journal of Neurophysiology.

Formal Teaching of Peers (e.g., CME and other continuing education courses)

None recently

Local Invited Presentations

2015 - Present	Epilepsy Grand Rounds North Shore University Hospital
2020	FIMR Seminar Series
2022	Columbia Engineering (ZMBBI Seminar Series)
2018	Translational Neuroscience Laboratories (C-BIN, Columbia University)

Report of Regional, National and International Invited Teaching and

Presentations

Invited Presentations and Courses

Regional

2018	NVC Neuromodulation (NANS Summer Series)	Poster presentation
2010	Undates on using Breathing as a Neuromodulation technique	i osici presentation
2022	Physiology First University (Portland, Main) Updates on neurophysiological changes underlying respiroception	Guest speaker
National		
2018	Society for Neuroscience (San Diego)	Guest speaker
	Breathing above the brainstem	1
2022	Society for Neuroscience (San Diego)	Poster presentation
	Neural bases of internal and external attentional states	Ĩ
2017	AES Annual Meeting (Washington DC)	Poster presentation
	Hyperexcitability of cortical circuits in epilepsy	Ĩ
2019	NIH Blueprint for Neuroscience Research	Guest
	The Science of Interoception and Its Roles in Nervous System Disorders	
	Bethesda	
Internatio	nal	
2016	OHBM Annual Meeting (Geneva)	Poster presentation
	Neural bases of attentional switching	±.

Report of Clinical Activities and Innovations

Practice Activities

2015 - Present	Primary Care Research	North Shore University Hospital
	Epilepsy Monitoring Unit	Lenox Hill Hospital

Clinical Innovations

My research at the FIMR tries to highlight the importance of breathing and the interactions between brain and body oscillations. This research has increased awareness on this topic among clinical staff who treat drug-resistance epilepsy (e.g., Dr. Fred Lado) and respiratory disorders (e.g., Dr. Harly Greenberg). NSUH has acquired respiratory physiology equipment to monitor breathing and other bodily oscillations for EMU patients, and this is now available as part of the standard of care in epilepsy.

Report of Technological and Other Scientific Innovations

I am currently working to develop novel methods to assess respiratory function with a higher degree of granularity (in collaboration with Dr. Harly Greenberg, Northwell). These methods include for the first-time state-of-the-art biofeedback techniques and assessments of respiroception (invasively) and non-invasively (in collaborations with Dr. Ashesh Mehta from Northwell, and Dr. Nima Mesgarani from Columbia Engineering). I hope that this research will yield to improved clinical batteries, in line with the NIH's current mission of finding biomarkers of interceptive functions.

Report	<u>of Education of Patients and Service</u>	<u>e to the Cor</u>	<u>nmunity</u>			
Activitie	25					
2018-P	resent Health Benefit Research Advisory C Physiology First University (Portland Provide advice, cardio-respiratory as athletes interested in improving their	Health Benefit Research Advisory Committee Physiology First University (Portland, Main) Provide advice, cardio-respiratory assessments, and research supervision of athletes interested in improving their performance/health using breathwork.				
2019	Artist in Residency Jonah Bokaer's Arts Foundation (Ch Dance performance using wearables	nezbuswick)				
Educati	onal Material for Patients and the Lay Con	nmunity				
2022	Coordinated Breathwork for Quanching	Author	Decourses for enviety			
2022	Anxiety	Author	(<u>link</u>)			
Books, mo	phographs, articles and presentations in other media					
2022	Your Outbreath and Your Brain	Interview	Mindful Magazine (<u>Link</u>)			
2018	Deep-slow breathing's impact on Epilepsy	Interview	Northwell News (<u>link</u>)			
2022	Physiology First	Interview	Education (<u>link</u>)			
2021	Breath as medicine	Interview	Education (<u>link</u>)			
2014	Neuronal Dynamics and the Mechanistic	Book	The Oxford Handbook of			
	Bases of Selective Attention	Chapter	Attention			

Educational material of curricula developed for non-professional students

2022	Physiology First	Co-Author	<u>Curricula</u>
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Recognition

2011	Best PhD Thesis	The Queen's Anniversary Medical Science Doctoral Prize
		Newcastle University, UK.
2022	High publication	Over 2171 citations and first authorship in top journals
	output	including Nature and Neuron.

Report of Scholarship

Peer Reviewed Publications in Print or Other Media

Research investigations

- 1. <u>Herrero</u> JL, Khuvis S, Yeagle E, Cerf M, & Mehta AD (2018). Breathing above the brain stem: volitional control and attentional modulation in humans. Journal of neurophysiology.
- 2. <u>Herrero</u> JL, Smith A, Mishra A, Markowitz N, Mehta AD, Bickel S (2021). Enhancing neuroplasticity through intracranial theta burst stimulation in the human sensorimotor cortex. Journal of Neurophysiology 126 (5), 1723-1739.
- 3. Chandrasekaran S, Bickel S, <u>Herrero</u> JL et al (2022). Evoking highly focal percepts in the fingertips through targeted stimulation of sulcal regions of the brain for sensory restoration. Brain stimulation 14 (5), 1184-1196.
- Improved Speech Hearing in Noise with Invasive Electrical Brain Stimulation (2022). Patel, P, Khalijhinejad B, <u>Herrero</u> JL, Bickel S, Mehta AD, Mesgarani N. Journal of Neuroscience 42 (17), 3648-3658.
- 5. Patel P, van der Heijden K, Bickel S, <u>Herrero</u> JL, Mehta, AD, Mesgarani N (2022) Interaction of bottom-up and top-down neural mechanisms in spatial multi-talker speech perception. Current Biology

Other peer-reviewed publications (ex: reviews, case reports, clinical pathologic conference reports)

- <u>Herrero</u> JL, Roberts MJ, Delicato LS, Gieselmann MA, Dayan P, Thiele A (2008). Acetylcholine contributes through muscarinic receptors to attentional modulation in V1. Nature, 454(7208), 1110-1114.
- 2. <u>Herrero</u> JL, Gieselmann, M. A., Sanayei, M., & Thiele, A. (2013). Attention-induced variance and noise correlation reduction in macaque V1 is mediated by NMDA receptors. Neuron, 78(4), 729-739.
- 3. Akbari H, Khalighinejad B, <u>Herrero</u> JL, Mehta AD, Mesgarani N (2019). Towards reconstructing intelligible speech from the human auditory cortex. Scientific reports, 9(1), 1-12.

Thesis

Herrero JLH. Neurophysiology and neuropharmacology of visual attention [2011, <u>thesis</u>]. Newcastle University (UK).

Abstracts, Poster Presentations and Exhibits Presented at Professional Meetings

Herrero JH & Mehta AD. Neuromodulation through Breathing Control. Poster presented at the North American Neuromodulation Society (NANS) 16th Annual Meeting, NYC, August 2018.

Herrero JH, Markowitz N, Tostaeva G, Schroeder CE, A D. Mehta & Bickel S. Differential effects of external vs. internal attention on sensory responses in the human insula. Poster to be presented at the Society for Neuroscience Annual Meeting (SFN), San Diego, November 2022.

Narrative Report (limit to 500 words)

The highlights of my accomplishments can be summarized as:

- 1. <u>Publication output</u>: Author and/or collaborator in 20+ high impact peer-review journal publications since joining FIMR, with a total of 2171 personal citations to date (<u>link</u>).
- <u>Funding skills</u>: extensive project management skills as demonstrated by my a) recently awarded RO1 (NHLBI), b) important contributions to multiple funded grants in the Human Brain Mapping Lab led by Dr. Mehta (Director of Epilepsy Neorosurgery, NSUH), c) collaboration with FIMR staff including Dr. Bouton (with 3 recently published articles) and others (Dr. Theodoros Zanos, Dr. Timir Datta, Dr Nima Mesgarani).
- 3. <u>Research skills</u>: 15+ years of experience analyzing complex data sets using different (invasive and non-invasive) neuroscience methods and experimental designs.
 - <u>Human electrophysiology</u>: 7+ years of experience at the department of neurosurgery (NSUH) working with epilepsy patients implanted with depth electrodes studying the neural substrates of cognitive functions (attention, speech, memory, and respiroception).
 - <u>Neuromodulation</u>: non-invasive and invasive electrical stimulation methods to induce neuroplasticity of cortical networks.
 - <u>Animal electrophysiology</u>: 7+ years of experience studying the neural circuits underlying attention to auditory and visual information in the macaque brain using a) laminar probes to record activity from different cortical layers and b) neuropharmacological methods including iontophoresis to study the cholinergic and glutamatergic contributions.
- 4. High profile editor roles in top journals in my field.
- 5. Recognized as an expert in neuroscience by various public media outlets and collaborators in the field of respiration and interoception.