BIOGRAPHICAL SKETCH

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NAME: Pelled, Galit

eRA COMMONS USER NAME (agency login): GALITPELLED

POSITION TITLE: Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)*

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Hebrew University, Jerusalem, Israel	BSc	1998	Biology
Hebrew University, Jerusalem, Israel	Ph.D.	2004	Neuroscience
NINDS, NIH, Bethesda, MD	Postdoctoral	2008	Neuroscience

A. PERSONAL STATEMENT

I have recently moved from Johns Hopkins School of Medicine and Kennedy Krieger Institute in Baltimore to direct the Neuroengineering division at the Institute of Quantitative Health and Sciences (IQ) in Michigan State University. This division encompasses an interdisciplinary set of neuroscientist, computer scientists, biochemists and engineers. Together we work towards discovering fundamental principles of brain function and developing innovative diagnostic and therapeutic technologies. Our research interests span a wide range of experimental and theoretical approaches that include neuroimaging, neuronal computation and modeling, neuro-nanotechnology, neurophotonics, brain stimulation and neuromodulation, neuro-prostheses, brain-computer and brain-machine interfaces.

My research focuses on understanding how injury changes neuronal connections, how neuromodulation impacts these changes, and how these changes affect recovery. We gain a comprehensive appreciation of neuroplasticity and how it translates into behavior by probing the system at the single neuron level all the way up to the whole organism level. Indeed, one of the characteristics that make my work unique is the multimodal approaches I employ. When we ask what happens in the rodent cortex after injury, we use intracellular electrophysiology to look at the single neuron level, we insert grids of electrode to map neuronal connections in vivo, we use functional MRI (fMRI) to detect changes in the whole-brain level, and we use a battery of behavioral tests to determine how injury effect cognitive, social and sensorimotor behavior. When we ask if neuromodulation after injury impacts recovery, we use light-sensitive channels (optogenetics) to increase or silence activity and non-invasive Transcranial magnetic stimulation (TMS). When we wanted to probe a specific population of neurons that is involved in reshaping connections after injury we bioengineered cell specific neuronal markers that can report on neuronal activity. Furthermore, when we wanted to complement the neuromodulation arsenal with the development of a technology that will allow a non-invasive way for cellular, location and temporal specific neuromodulation, we researched and discovered a gene in fish that navigate according to the earth magnetic field. This unique gene which encodes to a protein that is sensitive to electromagnetic fields has never been characterized before and was termed electromagnetic perceptive gene (EPG). We anticipate that this novel technology can transform the field of neuromodulation and complement the neuromodulation methodologies arsenal. My research has been published in high impact-scientific journals, and I have been NIH funded continuously since 2005. My funding includes 4 R01s as the principal investigator among them the prestigious R01 NIH EUREKA award. In addition, I have established a high-field preclinical imaging center at Johns Hopkins/Kennedy Krieger Institute, which was supported by a $6.5M NIH High-End Instrumentation awards and now services over 100 investigators, and a preclinical behavioral core that was supported by KKI and NIH U54 “Intellectual Developmental Disabilities Research Center” (KKI).

B. POSITIONS AND HONORS

Positions and Employment

11/2008-4/2014 Assistant Professor, Radiology Department, Johns Hopkins School of Medicine and Kennedy Krieger Institute

4/2014 – 8/2017	Associate Professor, Radiology Department, Johns Hopkins School of Medicine and Kennedy Krieger Institute
8/2017- present	Professor, Departments of Biomedical Engineering, Radiology and Neuroscience, Michigan State University
8/2017- present	Chief of Neuroengineering Division, Institute of Quantitative Health Sciences and Engineering, Michigan State University

Other Experience and Professional Memberships

2008	Chief Judge of neuroimaging section at Fellow Awards for Research Excellence
2008	Judge of NIH summer award program
2009-	Junior committee member, Brain Science Institute, Johns Hopkins
2011	Grant reviewer, Israel Science Foundation
2011	Ad hoc member, NIH ZRG1 Mechanism of Neurodegeneration, NIH study section
2011-	Chair, Animal Protocol Review Committee, Preclinical imaging facility, Kennedy Krieger Institute
2012	Grant reviewer, Israel-Czech Foundation
2012	Grant reviewer, Human Frontier Science Program
2011, 2012, 2014	Ad hoc member, NINDS DBD The Developmental Brain Disorders, NIH study section
2012	Ad hoc member, NINDS DBD The Developmental Brain Disorders, NIH study section
2014	Grant reviewer, University of Missouri
2014	Grant reviewer, Wayne State University
2015	Grant reviewer, Germany-Israel foundation
2015	Member, NIH, NEI BRAIN Initiative
2016	Member, NIH, NIMH BRAIN Initiative
2017	Member, NIH BRAIN Initiative
2018	Member, NIH BRAIN Initiative

Journal reviewer: *Neuroimage*, *Neurobiology of Aging, Synapse, JMRI, NMR in Biomedicine, Neuroscience, Journal of Neurophysiology, MRM , J Neuroscience, Frontiers, J Mol Neuroscience, Neuro and Neuro repair, Ame J Phys and Rehabil.*

Member: Society of neuroscience, International Society of Magnetic Resonance in Medicine, Federation of European Neuroscience Societies, Biomedical Engineering Society, IEEE

Conference organizer and Chair: International Society for Magnetic Resonance in Medicine (2007, 2011, 2013), World Molecular Imaging Congress (2016), International program committee, "IEEE EMBS international neural engineering conference (2017), Biomedical Engineering Society (2017).

Honors

2000-2004	Hebrew University Excellence Scholarship
2000	Travel award "European Society for Magnetic Resonance in Medicine and Biology"
2001	Travel award "International Society for Magnetic Resonance in Medicine"
2002	Most promising work in the "Federation of European Neuroscience Societies"
2002	Excellence award "Federation of European Neuroscience Societies," (FENS winter school)
2002	Travel awards "International Society for Magnetic Resonance in Medicine" and "Federation of European Neuroscience Societies"
2003	Travel award "International Society for Magnetic Resonance in Medicine"
2005	Young Investigator award "International Society for Neurochemistry" jointly with the "European Society for Neurochemistry"
2005	NRSA F32 Postdoctoral fellow award (NIH/NINDS)
2006	First place poster award winner "International Society for Magnetic Resonance in Medicine"
2007	Fellow Awards for Research Excellence (NIH)
2011	First place poster award, Johns Hopkins imaging conference
2012	NIH EUREKA award
2012	Early Career Reviewer (ECR) program at the CSR (NIH)
2013	SOM Leadership Program for Women Faculty
2015-2017	Advisory board member, U54 "Intellectual Developmental Disabilities Research Center"
2017	Advisory board member, Epilepsy Foundation

C. Contribution to Science

1. My research capitalizes on advances in molecular biology techniques to study brain function in animal models. We develop novel reporter genes and a genetic-based neuromodulation technology that provide a powerful and unprecedented tool, allowing cellular, temporal, and region-specific wireless neuromodulation.

1. Airan R, Li N, Gilad AA & **Pelled G.** Genetic tools to manipulate MRI contrast. NMR Biomed. PMCID: PMC3669659
2. Li N, van Zijl P, Thakor N & **Pelled G**. (2014) Study of the Spatial Correlation Between Neuronal Activity and BOLD fMRI Responses Evoked by Sensory and Channelrhodopsin-2 Stimulation in the Rat Somatosensory Cortex. J Mol Neurosci. PMCID: PMC4104155
3. Jouroukhin, Y., Nonyane B, Gilad, AA. & **Pelled, G.** (2014) Visualizing real-time changes in expression of immediate early genes associated with plasticity. J Mol Neurosci. PMCID: PMC4257867
4. Krishnan V, Park S, Shin SS, Alon L, Tressler C, Stokes W, Banerjee J, Sorrell M, Tian Y, Fridman G, Celnik P, Pevsner J, Guggino W, Gilad AA and **Pelled G.** (2018) "Wireless control of cellular function by activation of a novel protein responsive to electromagnetic fields", *Nature Scientific Reports* (ahead of print)

2. Over the past decade I have been interested in understanding how the brain rewires after injury. I have employed multi-modal technologies to detect post-injury plasticity from the cellular to the networks levels, making my research stand out in the field of neurorehabilitation. The plasticity mechanisms we have found, namely, cross-hemispheric plasticity, facilitated the development of therapeutic strategies for post-injury recovery. In addition, our findings had been recently reproduced by a number of labs in different animal models.

1. **Pelled G**, Chuang K, Dodd S, & Koretsky AP. (2007) FMRI Detection of bilateral cortical reorganization in the rodent brain following peripheral nerve deafferentation. *Neuroimage.* PMCID: PMC2253720
2. **Pelled G**, Bergstrom DA, Tierney PL, Conroy R, Chuang K, Yu D, Leopold DA, Walters JR, & Koretsky AP. (2009) Ipsilateral cortical fMRI responses following peripheral nerve damage in rats reflects interneuron-mediated Inhibition. *Proc Natl Acad Sci U S A*. PMCID: PMC2720851
3. Li N, Downey J, Bar-Shir A, Gilad AA, Walczak P, Kim H, Joel SE, Pekar JJ, Thakor NV & **Pelled G**. (2011) Optogenetic-guided cortical plasticity following nerve injury. *Proc Natl Acad Sci U S A*. PMCID: PMC3102379
4. Han Y, Li, N, Zeiler S & **Pelled G**. (2013) Peripheral nerve injury induces immediate increases in layer V neuronal activity. *Neurorehabilitation and Neural Repair*. PMCID: PMC3729632

3. We have found that nerve injury often leads to abnormal and maladaptive cortical plasticity that has the potential to hinder rehabilitation. In my research we use state-of-the-art neuromodulation technologies such as optogenetics and transcranial magnetic stimulation (TMS) to facilitate recovery. This line of research has generated considerable interest among basic science researchers and clinicians. For example, the TMS based neuromodulation for post traumatic brain injury recovery is now being translated into clinical trials at the Kennedy Krieger Institute.

1. Li N, Downey J, Bar-Shir A, Gilad AA, Walczak P, Kim H, Joel SE, Pekar JJ, Thakor NV & **Pelled G**. (2011) Optogenetic-guided cortical plasticity following nerve injury. *Proc Natl Acad Sci U S A.* PMCID: PMC3102379
2. Li N, Yang Y, Glover D, Zhang J, Saraswati M, Robertson C & **Pelled G**. (2013) Evidence for impaired plasticity after traumatic brain injury in the developing brain. *Journal of Neurotrauma.* PMCID: PMC3922417
3. Banerjee J., Sorrell M., Celnik P., & **Pelled G**. (2017) Immediate effects of repetitive magnetic stimulation on single cortical pyramidal neurons. *PLOS ONE.* 2017:Epub Ahead of Print.
4. Lu H., Kobilo T., Robertson C., Tong S., Celnik P., & **Pelled, G**. (2015) Transcranial magnetic stimulation facilitates neurorehabilitation after pediatric traumatic brain injury. *Scientific Reports.* PMCID: PMC4594036
5. Shin S, Krishnan V, Stokes, W, Robertson C, Celnik P, Chen Y, Song X, Lu H, Liu P and **Pelled G.** (2018) "Transcranial Magnetic Stimulation and Environmental Enrichment Enhances Cortical Excitability and Functional Outcomes after Traumatic Brain Injury ", *Brain Stimulation* (ahead of print)

Complete List of Published Work in My Bibliography:
http://www.ncbi.nlm.nih.gov/sites/myncbi/galit.pelled.1/bibliography/40793735/public/?sort=date&direction=ascending.

D. RESEARCH SUPPORT

Ongoing Research Support

1. 1R01NS072171-07 (PI: Pelled) 08/01/2015-07/31/20
NIH/NINDS
Title: The Role of the Transcallosal Pathway in Neuroplasticity Following Nerve Injury
The goal of this research is to investigate how modifications in the behavior of inter-hemispheric neuronal pathways affects recovery following peripheral nerve injury and how these pathways can be manipulated in order to promote recovery.

2. R01NS098231 (MPI: Pelled and Gilad) 07/01/17-06/30/22
NIH/NINDS
Bioengineering a novel electromagnetic perspective gene as a tool for wireless control of excitable cells
We have identified and cloned a single gene that encodes to a protein that is sensitive to electromagnetic fields (EMF). Here we propose to thoroughly characterize the EMF-sensitive protein in the cellular, molecular and functional levels. We will also test the EMF-sensitive protein effectiveness to wirelessly control neuronal function in vivo. Upon achieving our goals, this new technology has the potential to transform the neurostimulation field by offering a non-invasive, cellular-specific, temporal-specific and region-specific method to control neuronal function.

1. R01NS104306 (PI:Gilad) 07/01/18 – 06/31/22
NIH/NINDS
Title: Molecular Imaging for Detection of Synthetic Biology Circuits, Oscillators and Toggle Switches in Regenerative Medicine
Major goals: Here, for the first time, we will construct a synthetic biology device in mammalian cells and activate and image it noninvasively in a live rodent. We will bioengineer a synthetic circuit from three “bio-parts” a switch, an amplifier and a reporter gene. This innovative study is a unique approach to transition synthetic biology strategies from microorganism to mammalian systems with clear path for clinical translation.

Completed (as PI):

1. 1R01NS079288 (PI: Pelled) 04/01/12-12/31/16
NIH/NINDS
Title: Adaptive control of epileptic seizures using a genetically encoded sensor
We aim to develop a novel, minimally-invasive, neuronal specific therapeutic strategy to adaptively control neuronal firing rates in the epileptic brain. To test the efficacy of this new technology, we will use an animal model of experimental epilepsy that has been demonstrated to produce an epilepsy syndrome similar to human temporal lobe epilepsy.

2. 1R01NS072171 (PI: Pelled) 08/01/10-07/31/15
NIH/NINDS
Title: The Role of the Transcallosal Pathway in Neuroplasticity Following Nerve Injury
The goal of this research is to investigate how modifications in the behavior of inter-hemispheric neuronal pathways affects recovery following peripheral nerve injury and how these pathways can be manipulated in order to promote recovery.

3. Joint Johns Hopkins University-Technion program for the biomedical sciences 03/2013-03/2014
(PI: Pelled)
This research is designed to evaluate the changes in the extent of plasticity after injury associated with sleep disturbances, and identify the neuronal substrates and plasticity mechanisms underlying these changes.

4. Brain Science Institute (PI: Pelled) 09/01/12-08/30/13
Title: Long-term plasticity and recovery in pediatric TBI rat model

5. 1S10RR028955-01 (PI: van Zijl; Co-PI: Pelled) 04/2010-04/2011
NIH/National Center for Research Resources
11.7T HORIZONTAL BORE ANIMAL SCANNER

6. F32 Ruth L. Kirschstein NRSA-Individual Competitive Postdoctoral Fellowships (PI: Pelled)
NIH/NINDS 2005-2008
Title: Interhemispheric Cortical Plasticity Study Using MRI
This grant aimed to study the cellular and the network mechanisms that are involved in the induction and the maintenance of cortical reorganization following sensory deprivation.