

# **KAREEM A. ZAGHLOUL, MD, PHD**

Surgical Neurology Branch, NINDS  
Building 10, Room 3D20  
National Institutes of Health  
10 Center Drive, Bethesda, MD 20892-1414

## **EDUCATION**

*1991-1995* BSc, Massachusetts Institute of Technology, Cambridge MA  
Electrical Engineering and Computer Science

*1996-1997* Fellow, American University in Cairo, Cairo Egypt  
Center for Arabic Studies Abroad (CASA)

*1995-2003* MD, PhD, MSc, University of Pennsylvania, Philadelphia PA  
Neuroscience; Bioengineering

## **POST GRADUATE TRAINING**

*06/2003-06/2004* Intern, General Surgery, Hospital of the University of Pennsylvania  
Philadelphia PA

*07/2004-06/2010* Resident, Department of Neurosurgery, Hospital of the University of Pennsylvania  
Philadelphia PA

*07/2007-06/2008* Fellow, Stereotactic and Functional Neurosurgery, Dr. Gordon H. Baltuch  
Department of Neurosurgery, Hospital of the University of Pennsylvania  
Philadelphia PA

*09/2010-12/2010* Fellow, Epilepsy Surgery, Dr. Johannes Schramm  
Department of Neurosurgery, University of Bonn  
Bonn, Germany

## **ACADEMIC POSITIONS**

*08/2010-present* Staff Clinician, Surgical Neurology Branch, National Institutes of Neurological  
Disorders and Stroke, National Institutes of Health  
Bethesda, MD

*08/2010-present* Adjunct Assistant Professor, Interdisciplinary Program in Neuroscience,  
Georgetown University, Washington, DC

*08/2010-present* Adjunct Assistant Professor, Department of Neurosurgery,  
Georgetown University, Washington, DC

*09/2011-present* Adjunct Assistant Professor, Department of Neurosurgery, University of Virginia  
Health Sciences Center, University of Virginia, Charlottesville, VA

*01/2012-present* Adjunct Assistant Professor, Neuroscience and Cognitive Science,  
University of Maryland, College Park, MD

**LICENSURE**

Pennsylvania (Medical) MD427533

**PROFESSIONAL MEMBERSHIPS**

Congress of Neurological Surgeons  
American Association of Neurological Surgeons  
American Medical Association  
Society for Neuroscience  
Institute of Electrical and Electronics Engineers  
Sigma Xi Research Society

**PEER REVIEWED PUBLICATIONS**

Zaghoul KA, Weidemann CT, Lega BC, Jaggi JL, Baltuch GH, Kahana MJ (2012) Decision conflict modulates spiking activity in the human subthalamic nucleus during action selection. *Journal of Neuroscience* 32(7): 2453-60

Schiemann J, Schlaudraff F, Klose V, Bingmer M, Seina S, Magill PJ, Zaghoul KA, Schneider G, Liss B, Roeper J (2012) K-ATP channels in dopamine neurons of the medial substantia nigra control burst firing and novelty-induced exploratory behavior *Nature Neuroscience* 15(9): 1272-80

Weintraub D, Zaghoul KA (2012) The role of the subthalamic nucleus in cognition *Reviews in the Neurosciences* In Press

Lega BC, Kahana MJ, Jaggi JL, Baltuch GH, Zaghoul KA (2011) Neuronal and oscillatory activity during reward processing in the human ventral striatum *NeuroReport* 22(16): 795-800

Zaghoul KA and Schramm J (2011) Surgical management of glioneuronal tumors with drug resistant epilepsy *Acta Neurochirurgica* 6268: 1-9

Lega BC, Serruya MD, Zaghoul KA (2011) Brain Machine Interfaces: Electrophysiological Challenges and Limitations *Critical Reviews in Biomedical Engineering* 39(1): 121-144

Mehta GU, Heiss JD, Park JK, Asthagiri AR, Zaghoul KA, Lonser RR (2010) Neurological Surgery at the National Institutes of Health *World Neurosurgery* 74(1): 49-59

Zaghoul KA, Blanco JA, McGill K, Jaggi JL, Baltuch GH, Kahana MJ (2009) Human Substantia Nigra Neurons Encode Unexpected Financial Outcomes *Science* 323: 1496-99

Bauman JA, Church E, Halpern CH, Danish SF, Zaghoul KA, Jaggi JL, Stein S, Baltuch GH (2009) Subcutaneous Heparin for Prophylaxis of Venous Thromboembolism in Deep Brain Stimulation Surgery: Evidence From A Decision Analysis *Neurosurgery* 65(2): 276-80

Zaghoul KA, Heuer GG, Guttenberg MD, Shore EM, Kaplan FS, Storm PB (2008) Lumbar puncture and surgical intervention in a child with undiagnosed Fibrodysplasia Ossificans Progressiva. *Journal of Neurosurgery: Pediatrics* 1:91-94

Heuer GG, Zaghoul KA, Jaggi JL, Baltuch GH (2008) Use of an Integrated Platform System in the Placement of Deep Brain Stimulators. *Operative Neurosurgery* 1: 245-248

- Heuer GG, Hardesty DA, Zaghoul KA, Simon-Schwartz EM, Foley R, Storm PB (2008) Anatomic hemispherectomy for intractable epilepsy in a patient with unilateral schizencephaly. *Journal of Neurosurgery: Pediatrics* 2(2): 146-149
- Stiefel MF, Zaghoul KA, Bloom S, Gracias VH, LeRoux PD (2007) Improved cerebral oxygenation after high-dose inhaled aerosolized prostacyclin therapy for acute lung injury: A case report. *Journal of Trauma-Injury, Infection, and Critical Care* 63(5): 1155-1158
- Chen HI, Heuer GG, Zaghoul KA, Simon SL, Weigele JB, Grady MS (2007) Lumbar Vertebral Hemangioma Presenting with Acute Onset of Neurological Symptoms. *Journal of Neurosurgery: Spine* 7(1): 80-85
- Zaghoul KA, Manookin MB, Boahen KA, Demb JB (2007) Functional circuitry for peripheral suppression in mammalian Y-type retinal ganglion cells. *Journal of Neurophysiology* 97:4327-4340
- Heuer GG, Zaghoul KA, Roberts R, Stiefel MF, Storm PB (2007) Successful Microsurgical Extraction of a Migrated Coil After Failed Endovascular Closure of a Blalock-Taussig Shunt. *Journal of Neurosurgery: Pediatrics* 106(2): 136-138
- Zaghoul KA and Boahen KA (2006) A silicon retina that reproduces signals in the optic nerve. *Journal of Neural Engineering* 3: 257-267
- Zaghoul KA, Boahen KA, Demb JB (2005) Contrast adaptation in subthreshold and spiking responses of mammalian Y-type retinal ganglion cells. *Journal of Neuroscience* 25(4): 860-8
- Zaghoul KA and Boahen KA (2005) An On-Off log-domain filter circuit. *IEEE Transactions on Circuits and Systems* 52(1): 99-107
- Zaghoul KA and Boahen KA (2004) Optic nerve signals in a neuromorphic chip I: Outer and inner retina model. *IEEE Transactions on Biomedical Engineering* 51(4): 657-666
- Zaghoul KA and Boahen KA (2004) Optic nerve signals in a neuromorphic chip II: Testing and results. *IEEE Transactions on Biomedical Engineering* 51(4): 667-675
- Huang, JH, Zaghoul KA, Zager EL (2004) Surgical management of brachial plexus region tumors. *Surgical Neurology* 61(4): 372-378
- Zaghoul KA, Boahen KA, Demb JB (2003) Different circuits for On and Off ganglion cells cause different contrast sensitivities. *Journal of Neuroscience* 23: 2645-2654
- Demb JB, Zaghoul KA, Haarsma L, Sterling P (2001) Bipolar cells contribute to nonlinear spatial summation in the brisk-transient (Y) ganglion cell in mammalian retina. *Journal of Neuroscience* 21(19): 7447-7454
- Demb JB, Zaghoul KA, Sterling P (2001) Cellular basis for the response to second-order motion cues in Y retinal ganglion cells. *Neuron* 32: 711-721

## BOOK CHAPTERS

- Zaghoul KA and Schramm J (2012) Surgical Management of Medial Extratemporal Epilepsy in *Handbook of Clinical Neurology 3<sup>rd</sup> Edition* ed. Aminoff, M.J., Boller, F., and Swaab, D.F., Elsevier Ltd
- Zaghoul KA and Boahen KA (2006) Circuit designs that model the properties of the outer and inner retina. *Visual Prosthesis: New Hope In Sight*. ed. Tombran-Tink, J. and Barnstable, C., Humana Press

Zaghoul KA (2001) *A Silicon Implementation of a Novel Model for Retinal Processing*. Doctoral dissertation, Department of Neuroscience, University of Pennsylvania, Philadelphia, PA

## CONFERENCE PODIUM PRESENTATIONS

Zaghoul KA (2012) Chronic Intracranial Monitoring for Seizure Localization: Clinical Considerations and Scientific Implications. *Congress of Neurological Surgeons Annual Meeting*, Chicago, IL

Zaghoul KA (2012) Neuronal activity in the human subthalamic nucleus encodes decision conflict during action selection. *American Society for Stereotactic and Functional Neurosurgery*, San Francisco, CA

Zaghoul KA, Lega BC, Weidemann CT, Jaggi JL, Baltuch GH, Kahana MJ (2011) Decision Conflict Modulates Spiking and Oscillatory Activity in the Human Subthalamic Nucleus During Action Selection. *Congress of Neurological Surgeons Annual Meeting*, Washington, DC

Zaghoul KA (2011) Chronic Intracranial Monitoring for Seizure Localization: Clinical Considerations and Scientific Implications. *Congress of Neurological Surgeons Annual Meeting*, Washington, DC

Zaghoul KA, Burke JF, Jacobs J, Kahana MJ (2011) Alterations in Gamma Network Topology during a Free Recall Memory Task. *American Association for Neurological Surgeons Annual Meeting*, Denver, CO

Zaghoul KA, Burke JF, Jacobs J, Kahana MJ (2009) Differential theta and gamma coherence associated with successful memory encoding. *Society for Neuroscience Annual Meeting*, Chicago, IL

Zaghoul KA, Burke JF, Jacobs J, Manning J, Litt B, Kahana MJ, Baltuch GH (2009) Intracranial EEG for Neuronal Oscillatory Contingency During Cognitive Tasks, *American Association for Neurological Surgeons Annual Meeting*, San Diego, CA

Zaghoul KA, Blanco JA, McGill K, Jaggi JL, Baltuch GH, Kahana MJ (2008) Human Substantia Nigra Encodes Unexpected Outcome. *Society for Neuroscience Annual Meeting*, Washington, DC

Bauman JA, Church E, Halpern CH, Danish SF, Zaghoul KA, Jaggi JL, Stein S, Baltuch GH (2008) Subcutaneous Heparin for Prophylaxis of Venous Thromboembolism in Deep Brain Stimulation Surgery: Evidence From A Decision Analysis. *American Society of Stereotactic and Functional Neurosurgery Meeting*, Vancouver, BC, Canada

Zaghoul KA, Blanco JA, McGill K, Jaggi JL, Baltuch GH, Kahana MJ (2008) Reinforcement Learning in the Basal Ganglia during Deep Brain Stimulation. *American Society of Stereotactic and Functional Neurosurgery Meeting*, Vancouver, BC, Canada

Zaghoul KA, Blanco JA, McGill K, Jaggi JL, Baltuch GH, Kahana MJ (2008) Reinforcement Learning in the Basal Ganglia during Deep Brain Stimulation. *American Association of Neurological Surgeons Annual Meeting*, Chicago, IL

Zaghoul KA, Blanco JA, McGill K, Jaggi JL, Baltuch GH, Kahana MJ (2007) Reinforcement Learning in the Basal Ganglia during Deep Brain Stimulation. *19<sup>th</sup> Pan Philadelphia Neurosurgery Conference*, Philadelphia, PA

## INVITED TALKS

Zaghoul KA (2012) Exploring the neural correlates of cognitive function through neurosurgery, NINDS Advisory Council, National Institutes of Health, Bethesda, MD

Zaghoul KA and Lungu C (2012) Parkinson's Disease: From Genetics to Surgery, Demystifying Medicine Seminar, National Institutes of Health, Bethesda, MD

Zaghoul KA (2011) Exploring the neural correlates of human decision and memory through neurosurgery. Visiting Professor, Department of Neurosurgery, University of Iowa, Iowa City, IA

Zaghoul KA (2011) Exploring the neural correlates of human decision and memory through neurosurgery. NINDS Grand Rounds, National Institutes of Health, Bethesda, MD

Zaghoul KA (2011) Functional Neurosurgery: Communicating directly with the human brain. Army Research Laboratory, Adelphi, MD

Zaghoul KA (2011) Neural correlates of decision and memory in human neurosurgical patients. Department of Neuroscience, Georgetown University, Washington, DC

Zaghoul KA (2011) Functional neurosurgery, epilepsy, and human neurophysiology. Clinical Research Training Program, National Institutes of Health, Bethesda, MD

Zaghoul KA (2010) The neural correlates of cognitive function. NINDS Grand Rounds, National Institutes of Health, Bethesda, MD

Zaghoul KA (2010) Neuromodulation and neuroeconomics. Department of Psychology, University of Pennsylvania, Philadelphia, PA

Zaghoul KA (2009) Financial rewards in the human basal ganglia. Department of Psychology, University of Pennsylvania, Philadelphia PA

Zaghoul KA (2009) Future directions in neurosurgery: DBS surgery and neuromodulation. Wharton Business School, University of Pennsylvania, Philadelphia, PA

## **PREVIOUS GRANT SUPPORT**

*01/2010-12/2014* NIH K99/R00 Pathways to Independence (K99NS067241)

Reinforcement Learning in the Basal Ganglia

Role: Principal investigator

Mentor: Michael Kahana

To use deep brain stimulation surgery as a platform for exploring the neural correlates of cognitive function in basal ganglia structures

*01/2010-12/2012* NIH R21 Exploratory/Developmental Research NINDS (R21NS067316)

Intracranial EEG for Neuronal Oscillatory Contingency during Cognitive Tasks

Role: Co-investigator

Principal investigator: Michael Kahana

Developed and principally wrote proposal to develop a real-time feedback system conditioning cognitive stimulation on the presence of neuronal oscillations recorded from intracranial electroencephalogram (iEEG) signals

*12/2007-11/2010* Dana Foundation Grant

Intracranial EEG for Theta Rhythm Contingency During Cognitive Tasks

Role: Key personnel

Principal Investigator: Michael Kahana

Developed and principally wrote proposal to develop a real-time feedback system for a dynamic brain machine interface

**REVIEWER**

IEEE Transactions on Biomedical Engineering  
Nature Methods  
Journal of Semiconductor Technology and Science  
Brain  
Grant Reviewer – NFL Charities  
Neurosurgery

**TEACHING**

Georgetown University Medical Neuroscience Course

William Stacey, MD, PhD Associate Professor of Neurology University of Michigan. Kareem Zaghoul, MD, PhD Investigator, Functional and Restorative Neurosurgery Unit National Institute of Neurological Disorders and Stroke (NINDS). A<. Our Mission. The mission of the Epilepsy Foundation is to lead the fight to overcome the challenges of living with epilepsy and to accelerate therapies to stop seizures, find cures, and save lives. follow us. 3540 Crain Highway, Suite 675, Bowie, MD 20716 | 1.800.332.1000. Learn. Kareem Zaghoul Principal Investigator, Surgical Neurology Branch, NINDS. Biography. Teaching.Â Dr. Zaghoul received his B.Sc. degree from MIT in 1995 and his M.D. and Ph.D. degrees from the University of Pennsylvania in 2003. His graduate work focused on developing silicon models of visual processing in the mammalian retina with Dr. Kwabena Boahen. Dr. Zaghoul completed a residency in Neurological Surgery in 2010 from the University of Pennsylvania. During this time, he completed postdoctoral research with Dr. Michael Kahana, investigating the neural correlates of human memory encoding, decision, and reward. Dr. Zaghoul has completed clinical fellowships in Epilepsy Surgery and in DB by Kareem A. Zaghoul, MD, PhD,Edward F. Chang, MD. The Clinics: Surgery (Book Volume 27-1). Share your thoughts.Â Epilepsy, An Issue of Neurosurgery Clinics of North America, E-Book. by Kareem A. Zaghoul, MD, PhD,Edward F. Chang, MD. The Clinics: Surgery (Book Volume 27-1). Thanks for Sharing! Kareem Zaghoul. National Institutes of Health | NIH Â Surgical Neurology Branch. MD, PhD. Contact. About.Â How we measure 'reads'. A 'read' is counted each time someone views a publication summary (such as the title, abstract, and list of authors), clicks on a figure, or views or downloads the full-text. Learn more. 3,542.