

BIOGRAPHICAL SKETCH

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NAME: Kobylarz, Erik J.

eRA COMMONS USER NAME (credential, e.g., agency login): ejkobylarz

POSITION TITLE: Professor of Neurology; Adjunct Professor of Engineering; Director, Clinical Neurophysiology Fellowship Program; Director, Intraoperative Neurophysiologic Monitoring Service; Director, MD-PhD Program

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

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Columbia University, New York, NY	B.S.	05/83	Chemical Engineering
Dartmouth College, Hanover, NH	Ph.D.	06/91	Biomedical Engineering
Dartmouth Medical School, Hanover, NH	M.D.	06/91	Medicine
Walter Reed Army Medical Center, Washington, DC	Residency	06/95	Neurology
Walter Reed Army Medical Center, Washington, DC	Fellowship	06/96	Neuro-Ophthalmology
New York Presbyterian Hospital-Weill Cornell Medical Center and Memorial Sloan-Kettering Cancer Center, New York, NY	Fellowship	06/02	Clinical Neurophysiology

A. Personal Statement

I am an adult neurologist and biomedical engineer with subspecialties in clinical neurophysiology and epilepsy with related research and clinical interests. Specifically, I am interested in the application of engineering methods and techniques, as well as the development and utilization of medical devices and technology to study brain function, and to evaluate and treat neurologic diseases. I have participated in a broad range of research projects, including the quantitative analyses of neurophysiologic signals from patients with epilepsy, brain injuries, and other neurologic diseases, multiple medical device trials for the treatment of refractory epilepsy, the development and testing of a realistic EEG simulator, an EEG-NIRS recording cap, a portable brain recording device and app, and also a seizure detection device utilizing non-EEG based physiologic recordings, all of which are related to the proposed project. I have extensive experience in intracranial and peripheral nerve stimulation in both the intra- and extra-operative settings, which is essential for the proposed research project. I also serve as Director of the Clinical Neurophysiology (CNP) Fellowship and MD-PhD Programs, as well as the Intraoperative Neurophysiologic Monitoring Service. In summary my technical, research and clinical expertise, leadership, training and motivation make me well suited to participate as an investigator in this project, particularly serving the bridging role between my engineering and physician colleagues.

1. Fisher R, et al.; the SANTE Study Group (**Kobylarz E**, Sub-Investigator). Electrical stimulation of the anterior nucleus of thalamus for treatment of refractory epilepsy. *Epilepsia*. 2010 May;51(5):899-908. PMID: 20331461

2. Collier TJ, Kynor DB, Bieszczad J, Audette WE, **Kobylarz EJ**, Diamond SG. Creation of a human head phantom for testing of electroencephalography equipment and techniques. *IEEE Trans. on Biomed. Eng.* 2012. 59(9): 2628-2634. PMID: 22911537
3. Nair DR, et al, On behalf of the RNS System LTT Study (**Kobylarz EJ**, Site Investigator). Nine-year prospective efficacy and safety of brain-responsive neurostimulation for focal epilepsy. *Neurology*. 2020 Sep 1;95(9):e1244-e1256. PMCID: PMC7538230
4. Hamlin A, **Kobylarz EJ**, Lever JH, Taylor S, Ray L. Assessing the feasibility of detecting epileptic seizure using non-cerebral sensor data. *Comput Biol Med.* 2021 Mar;130:104232. PMID: 33516072
5. Richards H, Everitt A, Song Y, **Kobylarz EJ**, Lukovits TG, Rojas-Soto DM, Halter RJ, Murphy EK. Initial Results in a hdEEG/EIT Clinical Study on Strokes. *International Journal of Bioelectromagnetism*, Jan 2022; Suppl 24:290-293.
6. Everitt A, Richards H, Song Y, Smith J, **Kobylarz E**, Lukovits T, Halter R, Murphy E. EEG electrode localization with 3D iPhone scanning using point-cloud electrode selection (PC-ES). *J Neural Eng*, Dec 2023; PMID: 38055968

Ongoing and recently completed projects that I would like to highlight include:

1. A study of high-density electroencephalogram and electrical imaging for structural and functional assessment of stroke.
06/01/2020- present.
(PI E Murphy) Hitchcock Foundation Award, DHMC
Role: Co-I
2. Source localization using high density EEG and T1 brain MRI.
6/01/19-10/01/19.
Philips Neuro Diagnostics and Therapy Inc., Eugene, OR
Role: Co-I
3. Electrophysiological localization of brain function.
12/01/18-present.
(PI K Bujarski)
Diamond Research Development Award, DHMC Department of Neurology
Role: Co-I
4. A device to detect and quantify seizures using non-cerebral sensor modalities.
10/01/18-present.
Department of Defense Epilepsy Research Program Idea Development Award.
Role: PI
5. A multi-center investigator-initiated retrospective chart review of clinical outcomes in patients implanted with the new RNS system.
06/01/18-09/01/20.
Neuropace Inc., Mountain View, CA
Role: Site PI
6. Implantable Responsive Neurostimulation System (RNS) long term treatment clinical investigation.
8/2010 – 7/2019.
(PI B Jobst)
Neuropace Inc., Mountain View, CA Multi-center clinical trial of responsive cortical and subcortical stimulation for treatment of refractory epilepsy. In addition to clinical trial, performed quantitative EEG analyses prior to, during and after brain stimulation.
Role: Co-I

B. Positions, Scientific Appointments, and Honors

Positions and Appointments

- | | |
|--------------|--|
| 7/21-present | Appointments, Promotions and Titles Committee, Dept. of Neurology, Geisel School of Medicine, Dartmouth College, Hanover, NH |
| 7/21-present | Faculty and Admissions Committee member, Integrative Neuroscience at Dartmouth Program |
| 7/21-present | Adjunct Professor, Thayer School of Engineering, Dartmouth College, Hanover, NH |
| 5/21-present | Professor of Neurology, Geisel School of Medicine at Dartmouth, Lebanon, NH |
| 2/18-present | Director, MD-PhD Program, Geisel School of Medicine, Dartmouth College, Hanover, NH |

8/14-present Director, Clinical Neurophysiology Fellowship Program, Dartmouth-Hitchcock Medical Center, Lebanon, NH

7/14-6/21 Adjunct Associate Professor, Thayer School of Engineering, Dartmouth College, Hanover, NH

4/14-4/21 Associate Professor of Neurology, Geisel School of Medicine at Dartmouth, Lebanon, NH

10/11-present Faculty Member, MD-PhD Program Admissions and Advisory Committee, Dartmouth Medical School

6/11-6/21 Neurology Department Representative, Graduate Program in Experimental and Molecular Medicine Neuroscience Committee, Dartmouth Medical School

5/11-6/14 Adjunct Assistant Professor, Thayer School of Engineering, Dartmouth College, Hanover, NH

8/10-present Attending Neurologist, Epilepsy Program and Director, Intraoperative Neurophysiologic Monitoring Service, Dartmouth-Hitchcock Medical Center, Lebanon, NH

8/10-3/14 Assistant Professor of Neurology, Geisel School of Medicine at Dartmouth, Lebanon, NH

7/08-7/10 Director of Intraoperative Neurophysiologic Monitoring Service, New York Presbyterian Hospital - Weill Cornell Medical Center and Memorial Sloan-Kettering Cancer Center, New York, NY

7/03-6/08 Co-Director of Intraoperative Neurophysiologic Monitoring Service, New York Presbyterian Hospital - Weill Cornell Medical Center and Memorial Sloan-Kettering Cancer Center, New York, NY

7/02-7/10 Assistant Attending Neurologist, Clinical Neurophysiologist and Neuro-Ophthalmologist, New York Presbyterian Hospital - Weill Cornell Medical Center; Clinical Assistant Neurologist, Memorial Sloan Kettering Cancer Center and Hospital for Cancer and Allied Diseases; Neurology Consultant, Hospital for Special Surgery, New York, NY

7/03-7/10 Assistant Professor of Neuro-Ophthalmology in Ophthalmology, Weill Cornell Medical College

7/02-7/10 Assistant Professor of Neurology and Neuroscience, Weill Cornell Medical College, New York, NY

7/04-6/06 Director, Neurology Residency Program, Weill Cornell Medical College, New York Presbyterian Hospital, New York, NY

8/98-6/01 Clinical Instructor of Neurology and Neuro-Ophthalmology, Universität des Saarlandes School of Medicine, Homburg, Saarlandes, Germany

8/98-6/01 Clinical Director and U.S. Army Surgeon General Consultant for Telemedicine, Landstuhl Regional (U.S., Military) Medical Center, Landstuhl, Germany and European Regional Medical Command, Heidelberg, Germany

8/98-6/01 Attending Neurologist and Neuro-Ophthalmologist, Landstuhl Regional (U.S., Military) Medical Center, Landstuhl, Germany, Completed 10 years of active duty service in US Army, achieved rank of Lieutenant Colonel

7/96-6/98 Neurology Consultant, Comprehensive Clinical Evaluation Program (U.S. Army Surgeon General study of service members with symptoms and illnesses after the first Gulf War)

7/96-7/98 Assistant Professor, Department of Medicine (Neurology and Neuro-Ophthalmology) Texas A&M University School of Medicine, College Station and Temple, TX

7/96-7/98 Attending Neurologist and Neuro-Ophthalmologist, Darnall Army Hospital, Fort Hood, TX

7/92-6/96 Instructor, Dept. of Neurology, Uniformed Services University of Health Sciences, Bethesda, MD

9/83-5/85 Teacher Assistant, Department of Mathematics, Rutgers University

9/81-5/83 Teacher Assistant, Department of Mathematics, Columbia University

Other Experience and Professional Memberships

4/18-present Member of Group on Research, Education and Training, American Assn. Medical Colleges

2/14-present Board Member, Eastern Association of Electroencephalographers, President 2/2018-1/2020

2004-present Member of Engineering and Epilepsy, Neurostimulation and Translational Research Special Interest Groups, American Epilepsy Society

2003-present Member of Research and Investigation, and Guidelines Committees, American Society of Neurophysiologic Monitoring

2003-present Member of Medical Instrumentation and Resident & Fellow Education Committees, American Clinical Neurophysiology Society

1998-2001 Clinical Director and US Army Surgeon General Consultant, US Army Telemedicine Program in Europe.

1993-present Member of Informatics and Curriculum Committees, North American Neuro-Ophthalmology Society

1986-94 Member, Biomedical Engineering Society

Honors

2001 U.S. Army Meritorious Service Medal, Achieved rank of Lieutenant Colonel
1998 U.S. Army Achievement Medal
1994, 1995 Neurology Resident Research Award, 1st Place (1995) and 2nd Place (1994)
1985-1989 NIH (NHLBI) Ruth L. Kirchstein National Research Service Award
1985 Thayer School of Engineering Pre-Doctoral Fellowship, Dartmouth College
1983-85, 89-91 U.S. Army Health Professions Scholarship (full 4 year medical school scholarship)
1983 Phi Lambda Upsilon-Chemical Honorary Society

C. Contributions to Science

1. My early work focused on signal processing and quantitative analyses of physiologic recordings, as well as control theory of physiologic systems. During my doctoral studies I utilized and adapted signal processing and numerical analysis techniques for noise and artifact reduction, quantitative analysis and modeling of physiologic control systems.
 - a. Daubenspeck JA, Leiter JC, McGovern JF, Knuth SL, **Kobylarz EJ**. Diaphragmatic electromyography using a multiple electrode array. J Appl Physiol 1989;67(4):1525-34. PMID: 2793754
 - b. **Kobylarz EJ**, Daubenspeck JA. Immediate diaphragmatic electromyogram responses to imperceptible mechanical loads in conscious humans. J Appl Physiol 1992;73(1):248-259. PMID: 1506377
 - c. **Kobylarz EJ**, Daubenspeck, JA. Modeling human diaphragmatic electromyogram and airflow responses to imperceptible mechanical loads. Annals Biomed Eng 1993;21:475-488. PMID: 8239088
2. During and following my clinical neurophysiology fellowship, my research involved quantitative EEG and imaging analysis, as well as emerging therapies of patients with severe head injuries. My role in these studies was that of a co-investigator.
 - a. **Kobylarz EJ**, Schiff ND. Functional imaging of severely brain injured patients: progress, challenges, and limitations. Arch Neurol. 2004;61:1357-1360. PMID: 15364679
 - b. **Kobylarz EJ**, Schiff ND. Neurophysiologic correlates of persistent vegetative and minimally conscious states. Neuropsychological Rehabilitation 2005;15(3-4):323-332. PMID: 16350975
 - c. Voss HU, Ulug AM, Dyke JP, Watts R, **Kobylarz EJ**, McCandliss B, Heier LA, Beattie BJ, Hamacher KA, Vallabhajosula S, Goldsmith S, Ballon D, Giacino JT, Schiff ND. Possible axonal regrowth in late recovery from the minimally conscious state. J. Clin Invest. 2006 Jul 3;116(7):2005-2011. PMCID: PMC1483160
 - d. Schiff ND, Giacino JT, Kalmar K, Victor JD, Baker K, Gerber M, Fritz B, Eisenberg B, O'Connor J, **Kobylarz EJ**, Farris S, Machado A, McCagg C, Plum F, Fins JJ, Rezai AR. Behavioural improvements with thalamic stimulation 6 years after severe traumatic brain injury. Nature. 2007 Aug 2;448(7153):600-3. PMID: 17671503
3. More recently I have been involved in research and clinical trials of neurostimulation therapies for epilepsy. See also references in section A. Personal Statement. In the following study we utilized signal processing techniques to analyze the effects of responsive brain stimulation on intracranial EEG in patients implanted with the Neuropace device. My role in this study was that of a co-principal investigator.
 - a. Labar DR, Dakov PE, **Kobylarz EJ**, Nikolov BL, Schwartz T. Effects of responsive electrical brain stimulation on intracranial electroencephalogram spikes. Neuromodulation 2013 Jul;16(4):355-62. PMID: 24028274
4. I have also been involved in neurophysiologic and neuroimaging studies of patients with epilepsy and brain tumors. In this research we continued with the utilization of signal processing and numerical methods techniques to quantitate EEG and fMRI changes in epilepsy. My role in these studies was that of a co-investigator.

- a. Hosain SA, Solomon GE, **Kobylarz EJ**. Electroencephalographic patterns in unresponsive pediatric patients. *Pediatr Neurol*. 2005;32(3):162-5. PMID: 15730895
 - b. Liu J, **Kobylarz E**, Darcey T, Lu Z, Meng M, Wu YC, Jobst B. Improved mapping of interictal epileptiform activity with EEG-fMRI and voxel-wise functional connectivity analysis. *Epilepsia* 2014 Sep;55(9):1380-8. PMID: 25060924
 - c. Lane MA, Kahlenberg CA, Li Z, Kulandaival K, Secore KL, Thadani VM, Bujarski KA, **Kobylarz EJ**, Roberts DW, Tosteson TD, Jobst BC. The implantation effect: delay in seizure occurrence with implantation of intracranial electrodes. *Acta Neurol Scand*. 2016 Aug 16. PMID: 27531652
 - d. Pasquini LO, Peck KK, Tao A, Del Ferraro G, Correa DD, Jenabi M, **Kobylarz E**, Brennan C, Tabar V, Makse H, Holodny AI. Longitudinal Evaluation of Brain Plasticity in Low-Grade Gliomas: fMRI and Graph-Theory Provide Insights on Language Reorganization. *Cancers (Basel)*. 2023 Jan 29;15(3):836. PMCID: PMC9913404
 - e. Song Y, Surgenor JV, Leeds ZT, Kanter JH, Matrinez-Cambor P, Smith WJ, Boone MD, Abess, AT, Evans LT, **Kobylarz EJ**. Variables associated with cortical motor mapping thresholds: A retrospective data review with a unique case of interlimb motor facilitation. *Front Neurol*. 2023 Apr 11;14:1150670. PMCID: PMC10128911
5. We have received funding, both internally and more recently from the DoD to test and develop a device designed to detect and quantify epileptic seizures. It utilizes non-cerebral sensors and machine learning to differentiate seizure related vs. normal activities.
- a. E. Azad, D. Bajpai, R. Butler, and L. Sridhar, "A device to detect and quantify seizures." Thayer School of Engineering Bachelor of Engineering Final Report, March 3, 2016. Advised by **E. Kobylarz** and L. Ray.
 - b. L. Ray, H.K. Hall, J. Lever, S. Taylor, **E. Kobylarz**. System and method for identifying ictal states in a patient, US Patent Number 10485471 awarded 26 Nov. 2019
<https://patents.justia.com/patent/10485471> <https://patents.google.com/patent/US10485471B2/en>
 - c. Hamlin A, **Kobylarz EJ**, Lever JH, Taylor S, Ray L. Assessing the feasibility of detecting epileptic seizure using non-cerebral sensor data. *Comput Biol Med*. 2021 Mar;130:104232. Epub 2021 Jan 21. PMID: 33516072

Complete Lists of Published Work: <https://pubmed.ncbi.nlm.nih.gov/?term=kobylarz+e&sort=date>
https://scholar.google.com/scholar?hl=en&as_sdt=0%2C14&q=%22kobylarz+e%22&btnG=&oq=kobyl