

BIOGRAPHICAL SKETCH

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NAME: Kimford J. Meador

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

POSITION TITLE: Professor, Department of Neurology and Neurological Sciences, Stanford University

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
Georgia Institute of Technology	BS	06/1972	Applied Biology
Medical College of Georgia	MD	06/-1976	Medicine
University of Virginia	Internship	06/1977	Rotating
Medical College of Georgia	Residency	06/1983	Neurology
University of Florida	Research Fellowship	06/1984	Behavioral Neurology

A. Personal Statement: Dr. Meador is a behavioral neurologist and epileptologist. His areas of research include cognitive and behavioral effects of epilepsy, epilepsy therapies (meds, surgery, & stimulation) pregnancy & epilepsy, neurodevelopment effects of antiepileptic drugs, as well as, pharmacology and physiology of cognition, cerebral lateralization, and clinical trial design. Dr. Meador has been PI since 1999 on a NIH multicenter study of pregnancy outcomes in women with epilepsy including developmental effects of antiseizure medications. He has served as Director of Neuroscience Course, Neurology & Neurosurgery Clerkship, and Neurology Residency Training Program, and a member of the MD-PhD Advisory Council. Dr. Meador has provided research mentoring for undergraduate and medical students, residents, and postdoctoral fellows. He has trained 10 research fellows and 65 clinical fellows, served on 6 thesis committees, has been mentor for 15 junior faculty members, and is presently the Director of the Neurology Junior Faculty Mentor's Program. at Stanford University. He has over 400 peer reviewed publications on a variety of topics as detailed below. See link to publications in section C.

1. Meador KJ, Baker GA, Browning N, Clayton-Smith J, Coombs-Cantrell DT, Cohen M, Kalayjian LA, Kanner A, Liporace JD, Pennell PB, Privitera M, and Loring DW for the NEAD Study Group. Fetal antiepileptic drug exposure and cognitive function at age 3. New England Journal of Medicine 2009;360(16):1597-1605. PMID: 19369666.
2. Meador KJ, Loring DW. Developmental effects of antiepileptic drugs and the need for improved regulations. Neurology 2016;86(3):297-306. PMID: 26519545.
3. Meador KJ, Pirog Revill K, Epstein CM, Sathian K, Loring DW, Rorden C. Neuroimaging somatosensory perception and extinction. Neuropsychologia 2017;94:44-51. PMID: 27894900.
4. Meador KJ, Pennell PB, Ryan C. May RC, Brown CA, Baker G, Bromley R, Loring DW, Cohen MJ, for the NEAD Investigator Group. Effects of periconceptional folate on cognition in children of women with epilepsy: NEAD Study. Neurology 2020;18;94(7):e729-e740. PMID: 31871217.

B. Positions and Honors:

1977 – 1980 Commissioned Officer, Public Health Service, Public Health Service
 1984 – 1988 Assistant Professor, Department of Neurology, Medical College of Georgia
 1988 – 1993 Associate Professor, Department of Neurology, Medical College of Georgia
 1991 – 1993 Associate Professor, Department of Pharmacology/Toxicology, Medical College of Georgia
 1993 – 2002 Professor, Departments of Neurology & Pharmacology/Toxicology, Medical College of Georgia
 1984 – 2002 Director, Section of Behavioral Neurology, Medical College of Georgia

2002 – 2004 Professor & Chair, Department of Neurology, Georgetown University
 2004 – 2008 Professor, Department of Neurology, University of Florida
 2004 – 2008 Director, Epilepsy and Clinical Alzheimer Programs, University of Florida
 2008 – 2013 Professor, Department of Neurology, Emory University
 2009 – 2013 Director, Epilepsy, Department of Neurology, Emory University
 2010 – 2013 Professor, Department of Pediatrics, Emory University
 2013 - Professor, Department of Neurology & Neurological Sciences, Stanford University
 2013 - Director, Clinical Epilepsy Services, Stanford University
 2016 - Director, Junior Faculty Mentor's Program, Department Neurology at Stanford University

Honors:

1972 Phi Kappa Phi; Georgia Institute of Technology (High Honor), Atlanta, GA
 1977 Diplomat: National Board of Medical Examiners
 1985 Diplomat: American Board of Neurology & Psychiatry
 1982 Resident Teaching Award, Medical College of Georgia, Augusta GA
 1988 Outstanding Young Faculty Award, Medical College of Georgia, Augusta GA
 1989 McHenry Award, American Academy Neurology
 1989 Fellow: American Academy Neurology
 1989 Diplomat: American Neurological Association
 1999 Clinical Research Award, Medical College of Georgia, Augusta GA
 2001-2002 Charbonnier Endowed Chair, Medical College of Georgia, Augusta GA
 2001-2003 President: Society for Cognitive & Behavioral Neurology
 2001-2003 Chair: Behavioral Neurology Section, American Academy Neurology
 2002-2003 President: Southern EEG & Epilepsy Society
 2004-2008 Melvin Greer Endowed Chair, UF
 2009-2014 Member of NIH ANIE Study Section
 2011 Dreifuss Abstract Award, American Epilepsy Society
 2011 Clinical Research Award, American Epilepsy Society
 2013 Ranked top 10 epilepsy experts worldwide by Expertscape
 2014-2016 Chair: Epilepsy Section, American Academy Neurology
 2015 Distinguished Alumnus Award for Professional Achievement, Medical College of Georgia, Georgia Regents University, Augusta GA
 2015- Fellow, Royal College of Physicians of Edinburgh
 2017- Named award by the American Epilepsy Society:
 Kimford J. Meador Research in Women with Epilepsy Award.

C. Contributions to Science: Dr. Meador's research involves epilepsy (especially neuropsychological & pregnancy issues), pharmacology and physiology of cognitive mechanisms, cerebral lateralization, and the physiology of perception. He has >400 peer-reviewed publications.

Complete List of Published Work:

<http://www.ncbi.nlm.nih.gov/sites/myncbi/kimford.meador.1/bibliography/41158899/public/?sort=date&direction=ascending>

C1. Pregnancy and Epilepsy. Dr. Meador a leading expert on epilepsy and pregnancy. He has directed a large NIH-funded prospective multicenter study of the effects of fetal antiepileptic drugs (**AED**) exposure on cognitive development since 1999. The study demonstrated that fetal valproate exposure is associated with lower cognitive functions; its findings form the primary basis of 2 FDA warnings that fetal valproate exposure posed an increased risk for cognitive impairment (6-30-2011: <http://www.fda.gov/Drugs/DrugSafety/ucm261543.htm>), and re-categorized valproate to category X for treatment of migraine during pregnancy (5-6-2013: <http://www.fda.gov/Drugs/DrugSafety/ucm350684.htm>), and contributed to warnings by the European Medicine Authority. These warnings have directly impacted clinical practice reducing valproate use in women and limiting the number of children suffering lifelong deficits. Additional findings from this study demonstrated mitigating effects of periconceptional folate, potential fetal AED effects on cerebral lateralization, and the safety of breastfeeding on AEDs. Dr. Meador and colleagues are now in the 21st year of their investigation, and are examining child and maternal outcomes (e.g., changes in seizures and pharmacokinetics during pregnancy, incidence of OB complications, and frequency of depression during pregnancy/postpartum).

1. Meador KJ, Baker GA, Browning N, et al., for the NEAD Study Group. Fetal antiepileptic drug exposure

and cognitive outcomes at age 6 years: a prospective observational study. Lancet Neurology 2013;12(3):244-52. PMID: 23352199.

2. Meador KJ, Baker GA, Browning N, et al., for the NEAD Study Group. Breastfeeding in children of women on antiepileptic drugs: Cognitive outcomes at age 6 years. JAMA Pediatrics 2014;168(8):729-736. PMID: 24934501.
3. Meador KJ, Pennell PB, May RC, et al., for the MONEAD Investigator Group. Fetal loss and malformations in the MONEAD study of pregnant women with epilepsy. Neurology 2020;94(14):e1502-e1511. PMID: 31806691.
4. Birnbaum AK, Meador KJ, Karanam A, et al., for the MONEAD Investigator Group. Antiepileptic Drug Exposure in Infants of Breastfeeding Mothers with Epilepsy: Results from the MONEAD Study. JAMA Neurology 2019 Dec 30. doi:10.1001/jamaneurol.2019.4443. [Epub ahead of print]. PMID: 31886825.

C2. Cognitive and Behavioral Effects of Epilepsy and Its Treatments.

Dr. Meador has conducted numerous investigations examining the cognitive and behavioral effects of drugs for over 30 years, especially AEDs. He has delineated important design factors for such studies, demonstrated the magnitude of drug effects, shown clinically significant differential effects, and demonstrated that a patient's perception of their cognitive abilities is much more related to mood rather than performance. His work in this area has made him a leading expert on the cognitive and behavioral effects of AEDs. Beyond the effects of AEDs, Dr. Meador has systematically investigated the cognitive and behavioral effects of epilepsy and surgical treatments. Dr. Meador and colleagues conducted the first human studies directly demonstrating how epilepsy alters hippocampal physiological responses to cognitive tasks and the first human study demonstrating distinct fronto-temporal electrophysiological interactions during memory recall. These studies have helped establish the neuropsychological effects of epilepsy and its therapies. Dr. Meador's research in this area has contributed to better predictors of neuropsychological outcomes and impacted choice of AED, preoperative evaluations, surgical planning, and counseling of patients. In addition, Dr. Meador was one of the developers of the most widely used measure of quality of life in patients with epilepsy (QOLIE-89) and of a screening instrument for depression in epilepsy (NDDI-E). Both instruments are frequently used in research and clinical settings. The studies also demonstrated that depression is frequently undiagnosed and untreated in epilepsy patients, which has highlighted the importance of screening and treatment of depression in epilepsy.

1. Meador KJ, Loring DW, King DW, et al. Spectral power of human limbic evoked potentials: Relationship to seizure onset. Annals of Neurology 1988;23:145-151. PMID: 3377437.
2. Meador KJ, Loring DW, Boyd A, et al. Randomized double-blind comparison of cognitive and EEG effects of lacosamide and carbamazepine. Epilepsy & Behavior 2016;62:267-275. PMID: 27517350.
3. Adams J, Alipio-Jocson V, Inoyama K, et al. Methylphenidate, cognition, and epilepsy: A double-blind, placebo-controlled single-dose study. Neurology 2017;88(5):470-476. PMID: 28031390. (Dr. Meador is the senior and mentor to the first author).
4. Meador KJ, Seliger J, Boyd A, et al. Comparative neuropsychological effects of carbamazepine and eslicarbazepine acetate. Epilepsy & Behavior 2019 Mar 30;94:151-157. PMID: 30939410.

C3. Cerebral Lateralization. Dr. Meador has made multiple contributions to our understanding left vs. right brain functions. Using left vs. right cerebral amobarbital inactivations, he demonstrated: 1) clear left/right brain differences in eye gaze mechanisms and tactile perception; 2) more apraxic errors in patients with typical language dominance than those with atypical language dominance, irrespective of hand preference; 3) heart rate increased after left and increase after right hemisphere inactivations. His research team showed: 1) perceptual thresholds are lower in the left than right hand of healthy dextrals where as sinestrals have no overall asymmetry; 2) extinction to stimuli is more difficult to produce on the left than right hand of dextrals even after compensation for baseline threshold differences; 3) leftward eye/head gaze activates the right brain and lowers thresholds in both hands of dextral subjects (compared with right or straight gaze); 4) tactile stimuli to the non-attended hand activate the contralateral somatosensory area on fMRI, but to a lesser spatial extent than attended stimuli; 5) During identical bilateral sensory inputs, focused attention to the right hand increases activation in the left somatosensory region, but focused attention to the left hand increases activation in both cerebral hemispheres; 6) Dr. Meador also conducted the first human studies demonstrating that different effects of left/right brain lesions on immune mechanisms (i.e., left brain lesions reduce immune cells), and that peripheral cellular responses to histamine differ as a function of central lateralization (i.e., larger histamine skin responses on the left body of healthy dextrals with dextral relatives, larger on right for sinestrals/ambidextrals, and equal left/right asymmetries in dextrals with sinestral/ambidextral relatives).

1. Meador KJ, Loring DW, Lee GP, Brooks BS, Thompson EE, Thompson WO, Heilman KM. Right cerebral specialization for tactile attention as evidenced by intracarotid sodium amytal. Neurology 1988;38:1763-1766. PMID: 3185912.
2. Meador KJ, Loring DW, Lee GP, et al. Hemispheric asymmetry for eye gaze mechanisms. Brain 1989;112:103-111. PMID: 2917273.
3. Meador KJ, Ray PG, Day L, Ghelani H, Loring DW. Physiology of somatosensory perception: Cerebral lateralization and extinction. Neurology 1998;51:721-727. PMID: 9748016.
4. Meador KJ, Loring DW, Ray PG, Helman SW, Vazquez BR, Neveu PJ. Role of cerebral lateralization in control of immune processes in humans. Annals of Neurology 2004;55:840-4. PMID: 15174018.

C4. Physiology of Perceptual Awareness: Dr. Meador and colleagues were the first to demonstrate that loss of awareness during focal seizures is related to involvement of the thalamus and midbrain by the seizure. This has led to a series of investigations by others confirming this finding and showing that the spread of activity is associated with disruption of bi-hemispheric cortical activity. Dr. Meador's investigations have examined temporal aspects of perception. His group demonstrated that masking is maximal at 50-100ms after a target tactile stimulus, showing that perception is delayed and particularly susceptible to blockade at this post-stimulus interval. Dr. Meador also demonstrated that coherent electrical gamma activity occurs in the primary sensory cortex 150-300ms after perceived somatosensory stimuli but not unperceived stimuli, a finding which is consistent reentrant processing. Based on his seminal investigations, Ben Libet hypothesized decades ago that different stimuli and their components with different processing times were linked together as occurring simultaneous in our perception by the primary sensory potential. However, no experiments tested this hypothesis until Dr. Meador and colleagues showed that loss of the primary somatosensory evoked potential is associated with a 150ms delay in perception compared to the contralateral side with an intact somatosensory evoked potential. This finding is consistent with the primary sensory potentials acting as a marker for the temporal timing of perception. Dr. Meador's group also reproduced for the first time Libet's studies in humans that direct cortical stimulation in electrical trains lowers perceptual threshold for trains up to about 300ms without effects of longer trains. Meador's group also extended these studies to healthy subjects using transcranial magnetic stimuli, and they demonstrated that train effect was more pronounced in patients right brain stroke patients with mild neglect syndrome, suggesting that the physiological dysfunction in neglect syndrome limits the duration of stimulus effect to allow entrance into perceptual awareness.

1. Meador KJ, Ray PG, Day L, Loring DW. Relationship of extinction to perceptual thresholds for single stimuli. Neurology 2001;56:1044-1047. PMID: 11320176.
2. Meador KJ, Ray, PG, Echauz JR, Loring DW, Vachtsevanos GJ. Gamma coherence and conscious perception. Neurology 2002;59(6):847-54. PMID: 12297565.
3. Lee KH, Meador KJ, Park YD, et al. Pathophysiology of altered consciousness during seizures: Subtraction SPECT study. Neurology 2002;24:59(6):841-6. PMID: 12297563. (first author was Dr. Meador's fellow).
4. Meador KJ, Loring DW, Sathian K. Consciousness post corpus callosotomy. Brain 2017 Jul 1;140(7):e38. doi: 10.1093/brain/awx106. PMID: 28460007.

D. Additional Information: Research Support and/or Scholastic Performance:

ONGOING

- 2 U01 NS038455-16 Meador (Multi-PI) 08/01/2012– 04/30/2023
NIH/NINDS Maternal Outcomes and Neurodevelopmental Effects of Antiepileptic Drugs.
This is a 20-center prospective study, enrolled 450 mother/child pairs during pregnancy and 100 non-pregnant women with epilepsy. The major goals are to determine pregnancy outcomes in women with epilepsy (e.g., seizures, PK changes, OB complications, and depression) and their children (e.g., SGA, breastfeeding effects, and long-term cognition & behavior). Other Multi-PI: Pennell.
- R15HD097588 Xuerong Wen (PI) 1/23/2019 – 1/22/2021
NIH/NICHD Neonatal Neurodevelopmental and Maternal Outcomes in Pregnancy with Opioid Exposure.
This study examines effects of fetal opioid exposure on neonatal outcomes.
Role: Consultant.
- The Epilepsy Consortium French (PI) 7/1/2012 – 12/31/2020
The Human Epilepsy Project (HEP) Study
This study's primary goal is to identify clinical characteristics and biomarkers predictive of disease outcome and progression, and treatment response in participants with new onset or recently diagnosed focal epilepsy. Role: Co-I and Director of Cognitive Core.
- Medtronic Navigation, Inc. Halpern (PI) 6/1/2017 – 4/30/2021

Stereotactic Laser Ablation for Temporal Lobe Epilepsy.

This study is designed to evaluate the safety and efficacy of the Visualase MRI-guided laser ablation system for mesial temporal epilepsy. Role: Co-I.

- Eisai Inc. Razavi (PI) 7/1/2019 – 6/30/2021
Multicenter, Open-Label Study to Evaluate the Efficacy and Safety of Perampanel as Monotherapy or First Adjunctive Therapy in Subjects with Partial Onset Seizures with or without Secondarily Generalized Seizures or with Primary Generalized Tonic-Clonic Seizures.
This study examines efficacy and safety of perampanel as monotherapy for epilepsy. Role: Co-I.

PENDING

- NIH/NINDS Drane (PI) 2020 - 2025
Dissecting the Cognitive Roles of Hippocampus and Other Temporal Lobe Structures in Patients Undergoing Epilepsy Surgery.
This study investigates the role of temporal lobe structures in cognitive processes of declarative memory and language including determination of the critical network nodes for these functions. Role: Co-I

COMPLETED IN LAST 3 YEARS

- Sunovion, Meador (PI), 7/1/2016 – 12/10/2019 Double-Blind, Randomized, Two Period Crossover Comparison of the Cognitive and Behavioral Effects of Eslicarbazepine Acetate and Carbamazepine in Healthy Adults. This study compared cognitive and electrophysiological effects of eslicarbazepine to carbamazepine in healthy adults.
- R01NS088748-01, Drane (PI), 7/1/2014 – 6/30/2019. NIH/NINDS. Dissecting the Cognitive Roles of Hippocampus and Other Temporal Lobe Structures. This study investigates the role of temporal lobe structures in cognitive processes including episodic and semantic memory. Role: Co-I.
- 1 R01 NS076665-01, Marino (PI), 7/1/2012 – 6/30/2017. NIH/NINDS: Characterizing & Predicting Drug Effects on Cognition. This study characterized & predicted cognitive effects of drugs. Role: Consultant.