BIOGRAPHICAL SKETCH

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NAME: Moss, Heather Elspeth

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

POSITION TITLE: Assistant Professor, Department of Ophthalmology, 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
University of Guelph, Guelph, ON, Canada	B.Sc (eng.)	06/97	Biological Engineering
Harvard University, Cambridge, MA	Ph.D	06/03	Medical Engineering
Harvard Medical School, Boston, MA	M.D.	06/05	
Massachusetts General Hospital, Boston, MA	Intern	07/05-06/06	Internal Medicine
University of Pennsylvania, Philadelphia, PA	Resident	07/06-06/09	Neurology
American Board of Psychiatry and Neurology	Board Certification	09/09	Neurology
University of Pennsylvania, Philadelphia, PA	Fellow	06/09-06/10	Neuro-ophthalmology

A. Personal Statement

My career objective is to leverage the connection between the eye and the brain from two directions: to develop ophthalmic based markers of neurological diseases and to prevent blindness from the effects of neurological diseases on the eye. The foundation upon which I am uniquely positioned to fulfill this objective is my outstanding multi-disciplinary training, an innovative and diversified research program and an active clinical neuro-ophthalmology practice. In addition to fellowship training and extensive clinical experience in neuro-ophthalmology caring for patients with ocular changes related to neurological diseases, I have a Ph.D. in engineering with experience modeling and testing physiological systems in vivo in humans and graduate level training in epidemiology and biostatistics, with experience in human subjects research and clinical trial data analysis. I am fortunate to be supported by an NIH mentored career development award (NEI K23) and have applied my engineering and clinical expertise to build a research program focused on discovery and development of ophthalmic imaging and electrophysiology based optic nerve markers that will predict future vision loss and identify opportunities for intervention to prevent this.

B. Positions and Honors

Employment

2016 - Assistant Professor, Dept of Ophthalmology, Stanford University, Palo Alto, CA
2014 - 16 Assistant Professor, Dept of Neurology & Rehabilitation, University of Illinois, Chicago, IL
2010 - 16 Assistant Professor, Dept of Ophthalmology & Visual Sciences, University of Illinois, Chicago, IL

Other Experience and Professional Memberships

2006 - Member, American Academy of Neurology (fellow since 2016)
2010 - Member, North American Neuro-ophthalmology Society (fellow since 2016)
2011 - 16 Director, Neuro-ophthalmology Section, Department of Ophthalmology & Visual Sciences, University of Illinois, Chicago, IL

2011 - Assistant Editor, Neuro-ophthalmology
2013 - Member, Association for Research and Vision in Ophthalmology
2015 - NASA Peer Review Committee, Human Exploration Research Opportunities: Research and Technology Development to Support Crew Health and Performance in Space Exploration Missions, Reviewer
2015 - 16 Chair, Women in Neuro-Ophth. Committee, North American Neuro-ophthalmology Society
2016 - Review Editor, Current Eye Research
2016 - Vice chair, Neuro-ophthalmology Neuro-otology Section, American Academy of Neurology
2016 - Chair, Abstract Committee, North American Neuro-ophthalmology Society

Honors

1998-03 Graduate Fellowship in Biomedical Engineering, Whitaker Foundation
2009 Zeritsky Prize for Excellence in Research, University of Pennsylvania School of Medicine
2010 Cited for providing outstanding patient care, University of Illinois at Chicago Medical Center
2012, 2014 Teacher of the Year, Chicago Curriculum in Ophthalmology
2014, 2015 James A. McKenchnie Jr. Award for Best Grant, Illinois Society for the Prevention of Blindness
2015 Young investigator of the year Award, North American Neuro-Ophthalmology Society
2015 Rising Star Award, University of Illinois College of Medicine
2015 Sybil Harrington Special Scholar Award, Research to Prevent Blindness

C. Contributions to Science

1. Neuro-ophthalmology Clinical Research: The rarity of many neuro-ophthalmic diseases is a barrier to effective clinical outcomes research. I have contributed to overcoming this barrier through collaborations within and outside my institution to increase sample size, and through application of advanced statistical techniques to clinical trial data sets to maximize data analysis efficiency. To facilitate future research, I created and maintain a Neuro-ophthalmology Registry, which includes over 200 patients willing to consider participation in future research. I am actively involved in the NIH sponsored Neuro-ophthalmology Research Disease Investigator Consortium, through which I contributed to the Idiopathic Intracranial Hypertension Treatment Trial. An ongoing collaboration with Dr. Steven Roth, an anesthesiologist, is determining risk factors for post operative vision loss. These collaborative efforts have advanced, and form the foundation for future advances in, clinical research in neuro-ophthalmology.

a. **Moss HE**, Gao W, Balcer LJ, Joslin CE (2014). Race associations with visual outcomes following optic neuritis: an analysis of the Optic Neuritis Treatment Trial. JAMA Ophthalmol, 132(4):421-7. PMCID: PMC4115276
b. Bhaduri B, Nolan RM, Shelton RL, Pilutti LA, Motl RW, **Moss HE**, Pula JH, Boppart SA (2016) Detection of retinal blood vessel changes in multiple sclerosis with optical coherence tomography. Biomedical optics express 7:2321-2330. PMCID: PMC4918585.
c. Wall M, Kupersmith MJ, **Moss HE**, Moss EA, Auinger P, NORDIC Idiopathic Intracranial Hypertension Study Group (2017) The longitudinal idiopathic intracranial hypertension trial: outcomes from months 6-12" Am J Ophthalmol epub ahead of print Jan 17, 2017. PMCID: PMC5376520
d. Calway T, Rubin DS, **Moss HE**, Joslin CE, Mehta AI, Roth S. (2017). Perioperative Retinal Artery Occlusion: Incidence and Risk Factors in Spinal Fusion Surgery From the US National Inpatient Sample 1998-2013. J Neuroophthalmol. Epub ahead of print Jun 29. PMCID: in progress

2. Markers of Disease in Idiopathic Intracranial Hypertension (IIH): Permanent visual impairment due to papilledema, an optic neuropathy characterized by optic nerve swelling, occurs in approximately half of patients with IIH. There is a significant clinical need for non-invasive biomarkers that will advance diagnosis and management of IIH. The objective of my research is to establish physiologically based markers of retinal ganglion cell(RGC) function and retinal/cerebral vasculature as markers of IIH that detect abnormalities, monitor treatment and distinguish peripheral vision outcomes. I have demonstrated that retinal vein diameter changes over the course of disease. Through collaboration with Dr. Ali Alaraj, an endovascular neurosurgeon, we have defined characteristic changes in cerebral venous blood flow and pressure in IIH patients. Through collaboration with Dr. McAnany, a psychophysics expert, we have demonstrated alterations in objective markers of optic nerve function that correlate with other measures of disease in IIH patients. These results are

laying the scientific and technical foundation for the development of these markers as clinical tools and clinical trial outcome measures. Furthermore, the results are advancing scientific understanding of the pathophysiology underlying papilledema and other optic neuropathies.

a. **Moss, HE**, Wanek JM, Treadwell G, DeLeon S, Shahidi, M (2014). Retinal vessel diameter assessment in papilledema by semi-automated analysis of SLO images: feasibility and reliability. Invest Ophthalmol Vis Sci, 55(4):2049-54. PMCID: PMC3979275
b. **Moss HE**, Park CJ, McAnany JJ. (2015). The photopic negative response in idiopathic intracranial hypertension. Invest Ophthalmol Vis Sci. 56(6):3709-14. PMCID: PMC4466812
c. Park CJ, **Moss HE**, McAnany JJ. (2016). The pupillary light reflex in idiopathic intracranial hypertension. Invest Ophthalmol Vis Sci. 57(1):23-9. PMCID: PMC4713014
d. Gampa A, Vangipuram G, Shirazi Z, **Moss HE**. (2017) Quantitative association between peripapillary bruch's membrane shape and intracranial pressure. Invest Ophthalmol Vis Sci. 58(5):2739-45. PMCID: PMC5455169

3. Visual system involvement in amyotrophic lateral sclerosis (ALS): Clinical and post-mortem observations of pathological effects spreading beyond the motor system in some people with ALS have led to a shift from the classical characterization of ALS as a disease exclusively of motor neurons to that of a multisystem disorder. During my fellowship training in neuro-ophthalmology I led the largest characterization of clinical eye movement disorders in this population and discovered previously undocumented afferent visual dysfunction. Collaboration with Dr. Amani Fawzi has indicated that retinal pathology may account for this observation. We have surveyed different tests of afferent visual function to determine which are abnormal in ALS patients and which has the best correlation with visual system pathology in ALS patients.

a. **Moss HE**, McCluskey L, Elman L, Hoskins K, Talman L, Grossman M, Balcer LJ, Galetta SL, Liu GT (2012). Cross-sectional evaluation of clinical neuro-ophthalmic abnormalities in the ALS population. J Neurol Sci. 314: 97-101. PMCID: PMC3441141
b. Fawzi AA, Simonett JM, Purta P, **Moss HE**, Lowry JL, Deng HX, Siddique N, Sufit R, Bigio EH, Volpe NJ, Siddique T. (2014). Clinicopathologic report of ocular involvement in ALS patients with C9orf72 mutation. Amyotroph Lateral Scler Frontotemporal Degener. 15(7-8):569-80. PMCID: PMC4327840
c. **Moss HE**, Samelson M, Mohan F, Jiang QL (2016) "High and low contrast visual acuity are not affected in amyotrophic lateral sclerosis" PLoS ONE 11(12). PMCID: PMD5199071

Complete List of Published Work in MyBibliography:
http://www.ncbi.nlm.nih.gov/sites/myncbi/heather.moss.1/bibliograpahy/46368913/public/?sort=date&direction=ascending

D. Additional Information: Research Support

Ongoing Research Support

K23 EY024345 Moss (PI) 2014-2019
Physiologically Based Markers of Idiopathic Intracranial Hypertension (IIH)
The goal of this study is to establish markers of retinal ganglion cell function and retinal vasculature as markers of IIH. This grant also supports the PI's career development in the areas of clinical research, neuro-ophthalmic imaging and visual electrophysiology/psychophysics.
Role: PI

R21 EY027447 Roth (PI) 2017-2019
Risk Factor Analysis of Perioperative Vision Loss
The goal of this project is to study risk factors, develop a predictive model and externally validate the predictive model for perioperative visual loss in spinal fusion and cardiac surgeries using the National Inpatient Sample and The Optum database.
Role: Co-I

Completed Research Support

Illinois Society of the Prevention of Blindness Chen (PI) 2015-2016
Vision Loss and Papilledema in Patients with Brain Tumors
The purpose of this study is to establish the prevalence of papilledema in patients with malignant intracranial neoplasms and to determine the disease characteristics and symptoms that are associated with papilledema.
Role: Mentor

Eli Lilly & Company Inc. 2012 - 2016
A Prospective Case Crossover Study to Evaluate the Possible Association Between the Use of PDE5 Inhibitors and the Risk of Acute Nonarteritic Anterior Ischemic Optic Neuropathy (NAION)
Role: Site PI

Illinois Society of the Prevention of Blindness Vangipuram (PI) 2014-2015
Association between retinal vein size and short term intracranial pressure changes in idiopathic intracranial hypertension (IIH)
The goal of this study was to quantify changes in retinal vein diameters in patients with IIH following intracranial pressure lowering via spinal tap
Role: Mentor

Illinois Society of the Prevention of Blindness Moss (PI) 2013-2014
Ganglion Cell Dysfunction in Papilledema
The objective was to test the hypothesis that humans with idiopathic intracranial hypertension would have decreased ERG photopic negative response and attenuated chromatic pupil response due to impaired ganglion cell function
Role: PI

K12 EY021475 Azar (PI) 2011-2014
UIC K12 Independent Clinician Scientist Development Program
Project 1: Retinal vein and artery diameters in idiopathic intracranial hypertension (IIH)
Project 2: Race associations with visual acuity and contrast sensitivity outcomes following optic neuritis
Project 3: Neuro-ophthalmic abnormalities in amyotrophic lateral sclerosis (ALS)
Role: Scholar

Illinois Society of the Prevention of Blindness Oltra (PI) 2011-2012
Neurocognitive Function and Retinal Thinning in Sickle Cell Patients by Spectral Domain Optical Coherence Tomography
The objective was to test the hypothesis that retinal thinning in sickle cell patients is associated with cerebral microvascular disease and neuro-cognitive impairment
Role: Co-I

Quark Pharmaceuticals Inc. 2011-2012
Project: Phase I , open-label, dose escalation trial of QPI-100
The objective was to evaluate safety and tolerability of an intravitreal injection of a novel siRNA in individuals with recent non-arteritic ischemic optic neuropathy
Role: Site PI