




## Heather E. Moss, MD, PhD

Assistant Professor of Ophthalmology and of Neurology at the Stanford University Medical Center

 NIH Biosketch available Online

 Resume available Online

### CLINICAL OFFICES

- **Stanford Byers Eye Institute**

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### ACADEMIC CONTACT INFORMATION

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### Bio

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### CLINICAL FOCUS

- Neuro-ophthalmology
- Papilledema, pseudotumor cerebrii, idiopathic intracranial hypertension
- optic neuritis
- Neurology

### ACADEMIC APPOINTMENTS

- Assistant Professor - Med Center Line, Ophthalmology
- Assistant Professor - Med Center Line, Neurology & Neurological Sciences
- Member, Bio-X
- Member, Maternal & Child Health Research Institute (MCHRI)
- Member, Wu Tsai Neurosciences Institute

### ADMINISTRATIVE APPOINTMENTS

- Board of Directors, North American Neuro-Ophthalmology Society, (2017-2019)
- Chair, abstract committee, North American Neuro-ophthalmology Society, (2016-2020)
- Vice chair, neuro-ophthalmology & neuro-otology section, American Academy of Neurology, (2016-2018)
- Chair, Neuro-ophthalmology & neuro-otology section, American Academy of Neurology, (2018-2020)

### HONORS AND AWARDS

- Sybil Harrington Special Scholar Award, Research to Prevent Blindness (2015)
- Young Investigator of the Year, North American Neuro-ophthalmology Society (2015)
- Teacher of the year, Chicago Curriculum in Ophthalmology (2012, 2014)
- Zeritsky prize for research by a resident, University of Pennsylvania (2009)

- Biomedical engineering pre-doctoral fellowship, Whitaker Foundation (1998-2003)
- Science and Technology Award, Canadian Federation of University Women (1998)

## **BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS**

- Associate Editor, *Frontiers in Neurology, Neuro-ophthalmology* (2018 - present)
- Assistant Editor, *Neuro-ophthalmology* (2013 - present)
- Review Editor, *Current Eye Research* (2016 - present)
- Fellow, American Academy of Neurology (2016 - present)
- Fellow, North American Neuro-ophthalmology Society (2016 - present)

## **PROFESSIONAL EDUCATION**

- Internship: Massachusetts General Hospital Internal Medicine Residency (2006) MA
- fellowship, University of Pennsylvania , Neuro-ophthalmology (2010)
- board certification, American Board of Psychiatry and Neurology , Adult Neurology (2010)
- residency, University of Pennsylvania , Neurology (2009)
- intern, Massachusetts General Hospital , Medicine (2006)
- MD, Harvard Medical School (2005)
- PhD (joint program), Harvard-MIT Division of Health Sciences and Technology , Medical Engineering & Medical Physics (2003)
- PhD, Harvard University , Engineering Sciences (2003)
- B.Sc. (eng), University of Guelph (Canada) , Biological Engineering (1997)

## **LINKS**

- Get a Second Opinion: <https://stanfordhealthcare.org/second-opinion/overview.html>

## **Research & Scholarship**

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### **CURRENT RESEARCH AND SCHOLARLY INTERESTS**

Permanent vision loss caused by papilledema, the swelling of the optic nerve heads due to elevation in intracranial pressure (ICP), occurs in 50% of people with idiopathic intracranial hypertension (IIH) as well as individuals with high ICP from other neurological and neurosurgical diseases. One reason that blindness results from IIH, which is a treatable disease, is lack of timely, accurate clinical markers with which to identify those who are at risk of losing vision.

My research program seeks to identify and develop such markers through studies of papilledema physiology in humans affected by IIH. My current studies focus on humans with IIH because this accurately captures both the disease of interest and the target population. The conceptual frameworks that underlie my research program are drawn from my doctoral level engineering training. Using a mechanical (structural) framework I am evaluating the effect of changing intra-cerebral and intra-optic nerve forces from ICP and papilledema on the shape of the optic nerve and retinal blood vessels. Using an electrical (functional) framework I am evaluating patterns of visual pathway dysfunction in papilledema using non-invasive techniques of electrophysiology, pupillary light response and psychophysics. Markers based on both of these frameworks have the potential to capture the dynamics of pathophysiological changes associated with evolving and resolving papilledema with less delay than currently used clinical markers.

My aim is to develop non-invasive structural and functional markers of papilledema physiology that predict visual outcomes in IIH and guide tailored intervention that will improve visual outcomes and prevent blindness. The short-term objective of my research program is to evaluate candidate markers with regards to differences between untreated IIH, treated IIH and normal patients, changes over time in IIH patients receiving treatment, and differences between IIH patients with and without

vision loss. The long-term objective of my research program is to elucidate markers of papilledema physiology that can be studied non-invasively and to ascertain their ability to predict future visual function in IHH and guide clinical management.

Other areas of active research include study of peri-operative vision loss and visual pathway based diagnosis of neuro-degenerative diseases. I am actively involved in clinical trials through the Neuro-Ophthalmology Research Disease Investigator Consortium (NORDIC).

## CLINICAL TRIALS

- Efficacy & Safety of RPh201 Treatment in Patients With Previous Nonarteritic Anterior Ischemic Optic Neuropathy (NAION), Recruiting
- Phase 2/3, Randomized, Double-Masked, Sham-Controlled Trial of QPI-1007 in Subjects With Acute Nonarteritic Anterior Ischemic Optic Neuropathy (NAION), Not Recruiting
- Surgical Idiopathic Intracranial Hypertension Treatment Trial, Not Recruiting

## PROJECTS

- Physiologically Based Markers of Idiopathic Intracranial Hypertension - Stanford University
- Risk factors for peri-operative vision loss - Stanford University, University of Illinois at Chicago, University of Chicago
- Visual pathway based markers of neuro-degenerative disease
- Neuro-ophthalmology clinical research

## Publications

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### PUBLICATIONS

- **Anterior Optic Neuropathy in a Patient With Cyclical Fevers.** *JAMA ophthalmology*  
Jabbehdari, S., Lakusta, A. R., Moss, H. E.  
2020
- **Update on the Diagnosis and Treatment of Idiopathic Intracranial Hypertension.** *Seminars in neurology*  
Ahmad, S. R., Moss, H. E.  
2019; 39 (6): 682–91
- **Methods for Quantifying Optic Disc Volume and Peripapillary Deflection Volume Using Radial Optical Coherence Tomography Scans and Association With Intracranial Pressure** *FRONTIERS IN NEUROLOGY*  
Patel, M., Malhotra, K., Shirazi, Z., Moss, H. E.  
2019; 10
- **Predicting Risk of Perioperative Ischemic Optic Neuropathy: A Study Using the US National Inpatient Sample**  
Roth, S., Shah, S., Chen, Y., Moss, H., Rubin, D., Joslin, C.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019
- **Effect of posterior optic nerve and sheath boundary conditions on globe deformation in high intracranial pressure (ICP) states**  
Moss, H., Mehr, J., Hatami-Marbini, H.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019
- **Repeatability of the Photopic Negative Response in Stable Optic Neuropathy using a Handheld Electroretinogram System**  
Bui, A., Bindiganavale, M., Khushzad, F., Patel, M., Moss, H.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019
- **Development of Portable Pupillometer for Assessment of Optic Nerve Disease**  
Bindiganavale, M., Moss, H.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019
- **Patient Specific Models of Eye Geometry in High Intracranial Pressure States Based on Magnetic Resonance Images**  
Wasi, M., Moss, H.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2019

- **Perioperative Visual Loss in Cardiac Surgery** *JOURNAL OF CARDIOTHORACIC AND VASCULAR ANESTHESIA*  
Raphael, J., Moss, H. E., Roth, S.  
2019; 33 (5): 1420–29
- **Development of Portable Pupillometer for Assessment of Neurological Disease**  
Moss, H., Bindiganavale, M.  
LIPPINCOTT WILLIAMS & WILKINS.2019
- **Big Data Research in Neuro-Ophthalmology: Promises and Pitfalls.** *Journal of neuro-ophthalmology : the official journal of the North American Neuro-Ophthalmology Society*  
Moss, H. E., Joslin, C. E., Rubin, D. S., Roth, S.  
2019
- **Predicting Risk of Perioperative Ischemic Optic Neuropathy in Spine Fusion Surgery: A Cohort Study Using the National Inpatient Sample.** *Anesthesia and analgesia*  
Shah, S. H., Chen, Y. F., Moss, H. E., Rubin, D. S., Joslin, C. E., Roth, S.  
2019
- **Association Between Peripapillary Bruch's Membrane Shape and Intracranial Pressure: Effect of Image Acquisition Pattern and Image Analysis Method, a Preliminary Study** *FRONTIERS IN NEUROLOGY*  
Malhotra, K., Patel, M. D., Shirazi, Z., Moss, H. E.  
2018; 9
- **Update on Perioperative Ischemic Optic Neuropathy Associated With Non-ophthalmic Surgery** *FRONTIERS IN NEUROLOGY*  
Roth, S., Moss, H. E.  
2018; 9
- **Mechanical Factors contributing to ocular globe flattening in states of elevated intracranial pressure: A Finite Element Analysis**  
Mehr, J., Moss, H. E., Hatami-Marbini, H.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2018
- **Photopic Negative Response as a Marker for Optic Neuropathy using a Handheld Electroretinogram Device**  
Patel, M., Khushzad, F., Moss, H. E.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2018
- **Retinal venule diameters decreased following 6 months of treatment for high intracranial pressure in Idiopathic Intracranial Hypertension Treatment Trial participants**  
Moss, H. E., Hollar, R. A., Fischer, W. S., Feldon, S. E.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2018
- **Retinal Vessel Diameters Change Within 1 Hour of Intracranial Pressure Lowering** *TRANSLATIONAL VISION SCIENCE & TECHNOLOGY*  
Moss, H. E., Vangipuram, G., Shirazi, Z., Shahidi, M.  
2018; 7 (2): 6
- **Perioperative Retinal Artery Occlusion: Incidence and Risk Factors in Spinal Fusion Surgery From the US National Inpatient Sample 1998-2013.** *Journal of neuro-ophthalmology : the official journal of the North American Neuro-Ophthalmology Society*  
Calway, T., Rubin, D. S., Moss, H. E., Joslin, C. E., Mehta, A. I., Roth, S.  
2018; 38 (1): 36–41
- **Update on Perioperative Ischemic Optic Neuropathy Associated With Non-ophthalmic Surgery.** *Frontiers in neurology*  
Roth, S., Moss, H. E.  
2018; 9: 557
- **OCT in Central Nervous System Diseases (Book Review)** *NEURO-OPHTHALMOLOGY*  
Book Review Authored by: Moss, H. E., Grzybowski, A.  
2018; 42 (1): 48
- **Comparison of cross sectional optical coherence tomography images of elevated optic nerve heads across acquisition devices and scan protocols.** *Eye and vision (London, England)*  
Patel, M. D., Khushzad, F., Moss, H. E.

2018; 5: 17

- **Electroretinography in idiopathic intracranial hypertension: comparison of the pattern ERG and the photopic negative response.** *Documenta ophthalmologica. Advances in ophthalmology*  
Park, J. C., Moss, H. E., McAnany, J. J.  
2018; 136 (1): 45–55
- **Quantitative Association Between Peripapillary Bruch's Membrane Shape and Intracranial Pressure.** *Investigative ophthalmology & visual science*  
Gampa, A., Vangipuram, G., Shirazi, Z., Moss, H. E.  
2017; 58 (5): 2739-2745
- **The Longitudinal Idiopathic Intracranial Hypertension Trial: Outcomes from Months 6 - 12.** *American journal of ophthalmology*  
Wall, M., Kupersmith, M. J., Thurtell, M. J., Moss, H. E., Moss, E. A., Auinger, P.  
2017
- **Diagnostic Challenge: Sequential Unilateral Cranial Neuropathies Due to Perineural Spread of Carcinoma** *NEURO-OPHTHALMOLOGY*  
Moss, H. E., MacIntosh, P. W., Slavin, K. V., Collins, J. M.  
2017; 41 (4): 227–31
- **Cerebral Venous Thrombosis with Papilloedema Secondary to Skull Base Plasmacytoma** *NEURO-OPHTHALMOLOGY*  
MacIntosh, P. W., Lin, A. Y., Kim, J., Testai, F. D., Moss, H. E.  
2017; 41 (5): 284–86
- **Visual consequences of medications for multiple sclerosis: the good, the bad, the ugly, and the unknown.** *Eye and brain*  
Moss, H. E.  
2017; 9: 13–21
- **Validation of Simplified Visual Acuity Testing Protocols in Amyotrophic Lateral Sclerosis.** *Neuro-ophthalmology (Aeolus Press)*  
Boven, L. C., Jiang, Q. L., Moss, H. E.  
2017; 41 (5): 247–52
- **Diffuse Colour Discrimination as Marker of Afferent Visual System Dysfunction in Amyotrophic Lateral Sclerosis.** *Neuro-ophthalmology (Aeolus Press)*  
Boven, L., Jiang, Q. L., Moss, H. E.  
2017; 41 (6): 310–14
- **Perioperative Retinal Artery Occlusion: Risk Factors in Cardiac Surgery from the United States National Inpatient Sample 1998-2013.** *Ophthalmology*  
Calway, T., Rubin, D. S., Moss, H. E., Joslin, C. E., Beckmann, K., Roth, S.  
2017; 124 (2): 189–96
- **Ischemic Optic Neuropathy in Cardiac Surgery: Incidence and Risk Factors in the United States from the National Inpatient Sample 1998 to 2013.** *Anesthesiology*  
Rubin, D. S., Matsumoto, M. M., Moss, H. E., Joslin, C. E., Tung, A., Roth, S.  
2017
- **High and Low Contrast Visual Acuity Are Not Affected in Amyotrophic Lateral Sclerosis** *PLOS ONE*  
Moss, H. E., Samelson, M., Mohan, G., Jiang, Q. L.  
2016; 11 (12)
- **MACULAR DETACHMENT ASSOCIATED WITH ANOMALOUS OPTIC NERVES AND DURAL ECTASIA IN 49, XXXXY SYNDROME.** *Retinal cases & brief reports*  
Hajrasouliha, A. R., Moss, H. E., Maralani, P. J., Kaufman, L., Grassi, M. A.  
2016: -?
- **Perioperative Visual Loss in Spine Fusion Surgery: Ischemic Optic Neuropathy in the United States from 1998 to 2012 in the Nationwide Inpatient Sample.** *Anesthesiology*  
Rubin, D. S., Parakati, I., Lee, L. A., Moss, H. E., Joslin, C. E., Roth, S.  
2016; 125 (3): 457-464
- **Research Registries: A Tool to Advance Understanding of Rare Neuro-Ophthalmic Diseases.** *Journal of neuro-ophthalmology*  
Blankshain, K. D., Moss, H. E.  
2016; 36 (3): 317-323

- **Detection of retinal blood vessel changes in multiple sclerosis with optical coherence tomography** *BIOMEDICAL OPTICS EXPRESS*  
Bhaduri, B., Nolan, R. M., Shelton, R. L., Pilutti, L. A., Motl, R. W., Moss, H. E., Pula, J. H., Boppart, S. A.  
2016; 7 (6): 2321-2330
- **Bariatric Surgery and the Neuro-Ophthalmologist** *JOURNAL OF NEURO-OPHTHALMOLOGY*  
Moss, H. E.  
2016; 36 (1): 78-84
- **Cross-Sectional Analysis of Neurocognitive Function, Retinopathy, and Retinal Thinning by Spectral-Domain Optical Coherence Tomography in Sickle Cell Patients.** *Middle East African journal of ophthalmology*  
Oltra, E. Z., Chow, C. C., Wubben, T., Lim, J. I., Chau, F. Y., Moss, H. E.  
2016; 23 (1): 79-83
- **The Pupillary Light Reflex in Idiopathic Intracranial Hypertension** *INVESTIGATIVE OPHTHALMOLOGY & VISUAL SCIENCE*  
Park, J. C., Moss, H. E., McAnany, J. J.  
2016; 57 (1): 23-29
- **Retinal Vascular Changes are a Marker for Cerebral Vascular Diseases** *CURRENT NEUROLOGY AND NEUROSCIENCE REPORTS*  
Moss, H. E.  
2015; 15 (7)
- **The Photopic Negative Response in Idiopathic Intracranial Hypertension** *INVESTIGATIVE OPHTHALMOLOGY & VISUAL SCIENCE*  
Moss, H. E., Park, J. C., McAnany, J. J.  
2015; 56 (6): 3709-3714
- **Retinal Vessel Diameter Assessment in Papilledema by Semi-Automated Analysis of SLO Images: Feasibility and Reliability** *INVESTIGATIVE OPHTHALMOLOGY & VISUAL SCIENCE*  
Moss, H. E., Treadwell, G., Wanek, J., Deleon, S., Shahidi, M.  
2014; 55 (4): 2049-2054
- **Association of Race/Ethnicity With Visual Outcomes Following Acute Optic Neuritis An Analysis of the Optic Neuritis Treatment Trial** *JAMA OPHTHALMOLOGY*  
Moss, H. E., Gao, W., Balcer, L. J., Joslin, C. E.  
2014; 132 (4): 421-427
- **Isolated third, fourth, and sixth cranial nerve palsies from presumed microvascular versus other causes: a prospective study.** *Ophthalmology*  
Tamhankar, M. A., Biousse, V., Ying, G., Prasad, S., Subramanian, P. S., Lee, M. S., Eggenberger, E., Moss, H. E., Pineles, S., Bennett, J., Osborne, B., Volpe, N. J., Liu, et al  
2013; 120 (11): 2264-2269
- **Cross-sectional evaluation of clinical neuro-ophthalmic abnormalities in an amyotrophic lateral sclerosis population** *JOURNAL OF THE NEUROLOGICAL SCIENCES*  
Moss, H. E., McCluskey, L., Elman, L., Hoskins, K., Talman, L., Grossman, M., Balcer, L. J., Galetta, S. L., Liu, G. T.  
2012; 314 (1-2): 97-101
- **Visual and Systemic Outcomes in Pediatric Ocular Myasthenia Gravis** *AMERICAN JOURNAL OF OPHTHALMOLOGY*  
Pineles, S. L., Avery, R. A., Moss, H. E., Finkel, R., Blinman, T., Kaiser, L., Liu, G. T.  
2010; 150 (4): 453-459
- **Noninvasive Measurement of Cerebral Blood Flow and Blood Oxygenation Using Near-Infrared and Diffuse Correlation Spectroscopies in Critically Brain-Injured Adults** *NEUROCRITICAL CARE*  
Kim, M. N., Durduran, T., Frangos, S., Edlow, B. L., Buckley, E. M., Moss, H. E., Zhou, C., Yu, G., Choe, R., Maloney-Wilensky, E., Wolf, R. L., Grady, M. S., Greenberg, et al  
2010; 12 (2): 173-180
- **Anti-N-Methyl-D-Aspartate Receptor (NMDAR) Encephalitis in Children and Adolescents** *ANNALS OF NEUROLOGY*  
Florance, N. R., Davis, R. L., Lam, C., Szperka, C., Zhou, L., Ahmad, S., Campen, C. J., Moss, H., Peter, N., Gleichman, A. J., Glaser, C. A., Lynch, D. R., Rosenfeld, et al  
2009; 66 (1): 11-18